ARGONNE NATIONAL LABORATORY-WEST

Final Draft
LTS Implementation Plan for Argonne National Laboratory-West

Prepared for:

DOE-CH Long-Term Stewardship Pilot Project

Planning Critical Elements of the Transition to Long-Term Stewardship at Chicago Operations Facilities

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ACRONYMS

AAO-W	DOE/Argonne Area Office-West
ANL-E	Argonne National Laboratory-East
ANL-W	Argonne National Laboratory-West
BLS	Below land surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFA	Central Facilities Area
CY	Calendar Year
DOE	Department of Energy
DOE-CH	DOE-Chicago Operations Office
DOE-Idaho	DOE-Idaho Operations Office
D&D	Decontamination and Decommissioning
EBR-II	Experimental Breeder Reactor-II
EM	DOE Office of Environmental Management
EMS	Environmental Management System
EP	Environmental Programs
EPA	Environmental Protection Agency Region X
EPC	Experimental Breeder Reactor-II Plant Closure
EQO	Environment, Safety and Health and Quality Assurance Oversight
ESD	Explanation of Significant Difference
FCF	Fuel Conditioning Facility
FFA/CO	Federal Facilities Agreement/ Consent Order
FY	Fiscal Year
HFEF/S	Hot Fuel Examination Facility-South
HWMA	Idaho Hazardous Waste Management Act
IDEQ	Idaho Department of Environmental Quality
IDHW	Idaho Department of Health and Welfare
IHX	Intermediate Heat Exchanger
INEEL	Idaho National Engineering and Environmental Laboratory
ISM	Integrated Safety Management
ISO	International Organization for Standardization
IWP	Industrial Waste Pond
LTS	Long-Term Stewardship
MSL	Mean Sea Level
Na	Sodium
Na_2CO_3	Sodium Carbonate
$NaHCO_3$	Sodium Bicarbonate
NaK	Sodium Potassium Alloy
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NE	DOE- Office of Nuclear Energy
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit

ACRONYMS (continued)

PSS	Primary Sodium System
PMP	Program Management Plan
PSO	Program Secretarial Office
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Liability Act
RD/RA	Remedial Design / Remedial Action
RGs	Remediation Goals
RI/FS	Remedial Investigation / Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SSS	Secondary Sodium System
S&M	Surveillance and Monitoring
SPF	Sodium Process Facility
SRPA	Snake River Plane Aquifer
TREAT	Transient Reactor Test Facility
TSD	Treatment/Storage/Disposal
WAG	Waste Area Group
ZPPR	Zero Power Physics Reactor

Long-Term Stewardship (LTS) Implementation Plan for Argonne National Laboratory-West

1. OVERVIEW OF THE ANL-W SITE

Argonne National Laboratory - West (ANL-W), a prime operating contractor to the Department of Energy Chicago Operations Office (DOE-CH), began a redirected nuclear research and development program in FY 1995. The redirected program involves research to help solve near-term high priority missions including the treatment of DOE spent nuclear fuel and reactor decontamination and decommissioning technologies. At the ANL-W site are numerous research and support facilities that contribute to the total volume of waste generated at ANL-W. These facilities currently generate radioactive low-level waste, radioactive transuranic waste, hazardous waste, mixed waste, sanitary waste, and industrial waste. Approximately 750 people are employed at the ANL-W facility.

2. INTRODUCTION TO LTS PROGRAM

The LTS program at ANL-W consists of activities designed to identify and minimize any hazards posed by residual contamination or wastes remaining at waste sites and contaminated facilities (or portions of a site/facility) during long-term remedial actions or after cleanup is complete. These activities include institutional controls, operation and maintenance, environmental monitoring and reporting, performance assessment, contingency planning and information management. The program will be funded and overseen by DOE and administered by various organizations within ANL-W.

3. USE OF TERMS

Key terms used in this document are defined below.

Contaminated Facility – Any facility containing radioactive contamination, hazardous waste and/or hazardous chemical within components, structures or natural media (soil, groundwater or surface water).

Long-Term Stewardship – The set of activities needed to (1) ensure compliance with regulatory requirements, including inspection and monitoring, report preparation, performance assessment, document retention, and other required activities; (2) ensure effective operations and maintenance of any remedial action put in place to facilitate ongoing effectiveness of the remedial action; (3) initiate and maintain any institutional controls needed to ensure that sites with residual contamination are not inadvertently disturbed by on-site or off-site personnel; (4) retain all plans, reports, correspondence, and other records related to completed remedial actions; (5) periodically reassess completed remedial actions to ensure that the original remedial actions are still adequately protective of human health or the environment; and (6) develop and maintain contingency plans and procedures to respond to fires, structural collapse, flooding,

wind damage, or other catastrophic events that could liberate and disperse contaminates and to detect and correct failures caused by long-term degradation of remedial systems.

No Action (NA) – The regulatory status of a unit that has been remediated by the removal of contamination (if characterization demonstrated that removal was necessary) to a level that permits other beneficial uses (i.e., unrestricted use) of the land. NA status for solid waste management units (SWMUs) is considered granted when the Environmental Protection Agency Region X (EPA) and IDEQ issue a letter acknowledging that the remedial actions that resulted in the removal of contamination have been completed in accordance with the Record of Decision.

No Further Remediation (NFR) –The regulatory status of a unit for which all anticipated remedial construction actions, including physical construction, site restoration, and equipment start-up, have been completed to the satisfaction of the overseeing authorities (the EPA, IDEQ, and DOE in the case of SWMUs and DOE in the case of non-SWMU voluntary cleanup projects and Decontamination and Decommissioning (D&D)), and all required inspections, operations, maintenance of operational remedies and engineered barriers, and institutional controls are in place. Residual contamination and waste materials may or may not be present at such facilities; however, the remedial actions completed will have reduced the risk associated with any such residual contamination to levels acceptable to the overseeing authorities.

Ongoing remediation – A set of activities that need to continue after all anticipated remedial action construction and start-up of operational remedies have been completed but where residual contamination levels above those necessary to achieve NA status are present. These activities are required at these sites to prevent the release of the contaminants, or to remove or destroy the contaminants. These activities include inspection and periodic maintenance of engineered barriers such as paint over contaminated concrete; or the operation and maintenance of operable remedies such as phytoremediation systems, building drainage systems, or similar ongoing efforts. Routine environmental monitoring may also be required. Such efforts would be required until the contaminant concentrations are reduced to less than the remediation objectives (or equivalent criteria for non-SWMUs) and the overseeing authority approves the discontinuation of such actions.

Waste site – Any SWMU that underwent investigation under the Federal Facility Agreement/Consent Order or other interagency agreements.

4. PURPOSE AND SCOPE

The purpose of the ANL-W LTS Program is to encompass, under one umbrella, those activities necessary to protect human health and the environment from hazards posed by residual contamination or wastes remaining at ANL-W sites. The ANL-W LTS plan provides for (1) long term planning, implementation, and maintenance, and (2) DOE and ANL-W commitment to regulators and stakeholders to provide stewardship for the ANL-W site for as long as required.
LTS activities at ANL-W are designed to ensure that the remedial actions put into place remain effective for an extended period of time, until such time that the residual hazard is reduced to levels that allow unrestricted use and unlimited access.

The activities within the ANL-W LTS program include operations, surveillance, maintenance, monitoring (air, soil and water), inspections, institutional controls and record keeping of remedial action units that are not acceptable for release to the public for unrestricted use. A waste site or HWMA/RCRA contaminated facility (which is to undergo HWMA/RCRA closure) is considered to be in the LTS phase once:

- required remediation (or "cleanup") activities have been completed, or
- in the case of long-term remedial actions (e.g., natural attenuation) the remedy is functioning properly and operating as designed.

The LTS program at ANL-W will be integrated into existing environmental management efforts that are ongoing at ANL-W. This integration provides the mechanism to ensure regulatory requirements are met well in the future. The two predominant environmental regulations involved in the ANL-W LTS are the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA). Waste sites at ANL-W are being remediated under CERCLA. Contaminated facilities, containing hazardous waste are being remediated under HWMA/RCRA.

The sites that are undergoing or will undergo phytoremediation will have the nonradiological contamination reduced to levels that allow for release of the site for unrestricted use. The EBR-II primary and secondary Na and NaK systems will have the Na and NaK physically removed or the hazardous waste residue will be treated in-place. However, for several of the waste sites and for the Experimental Breeder Reactor-II (EBR-II) primary and secondary sodium systems, the radiological contamination will require ongoing surveillance, maintenance, monitoring and institutional control as part of the LTS of these sites. All the sites will require long-term management of historic records to document investigations and that clean-up was completed to the satisfaction of the EPA Region X, IDEQ and DOE, and to describe how much contamination is still present. These activities and administrative mechanisms needed to support these activities will constitute the LTS program for ANL-W.

5. ANL-W SITE DESCRIPTION

The ANL-W was established in the mid 1950s and is located approximately 30 miles west of Idaho Falls. ANL-W houses extensive support facilities for three major nuclear reactors: Transient Reactor Test Facility (TREAT), EBR-II, and the Zero Power Physics Reactor (ZPPR). The locations of the main facilities at ANL-W are shown in Figure 5-1.

The first reactor to operate at the ANL-W site was TREAT, which was built in 1959. As its name implies, TREAT was designed for overpower transient tests of fuel. Its driver fuel, consisting of finely divided uranium oxide in a graphite matrix, has a high heat capacity that

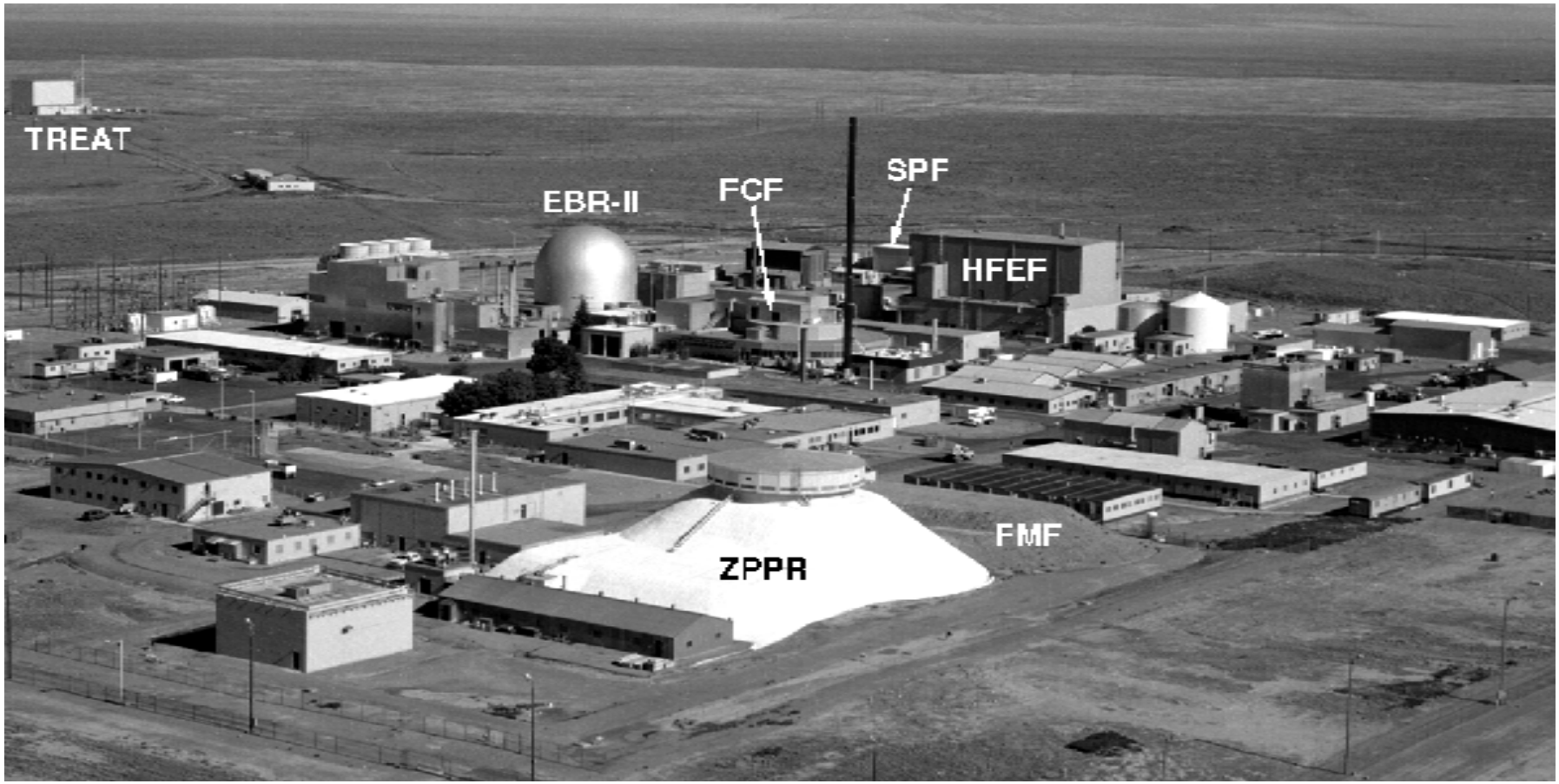

Figure 5-1: Aerial View of the ANL-W Main Facilities

EBR-II -Experimental Breeder Reactor
FCF -Fuel conditioning Facility
FMF -Fuel Manufacturing Facility
HFEF -Hot Fuel Examination Facility
SPF -Sodium Processing Facility
ZPPR -Zero Power Physics Reactor
TREAT -Transient Reactor Test Facility

enables it to withstand tests in which experimental fuel may be melted. Used extensively at first for safety tests of water-reactor fuels, TREAT is now used mainly for safety tests for various fuel types as well as for non reactor experiments. It has periodically undergone modifications as part of the TREAT upgrade project.

The EBR-II a 62.5 megawatt thermal reactor went into operation in 1964 capable of producing 19.5-megawatts of electrical power in the liquid metal reactor power plant. It was a pool-type sodium-cooled reactor, designed to operate with metallic fuel. It was provided with its own Fuel Cycle Facility adjacent to the reactor building for remote pyrometallurgical reprocessing and refabrification of reactor fuel. The Fuel Cycle Facility operated from 1964 providing five complete core loadings of recycled fuel for EBR-II.

Over the years, the mission of the EBR-II has been redirected from that of a power-plant demonstration with integral fuel cycle to that of an irradiation test facility for mixed uranium-plutonium fuels for future liquid metal reactors. The pyrometallurgical process used in the Fuel Cycle Facility was not suitable for ceramic fuels so the Fuel Cycle Facility was converted to a Hot Fuel Examination Facility South (HFEF/S).

EBR-II continued to be fueled with metallic uranium driver fuel for operating convenience. Over the years of operation, much valuable operating experience has been gained on sodium systems, including the removal and maintenance of primary sodium pumps and other components. In the 1970s, the mission of the EBR-II was again shifted in emphasis, this time to the Operational Reliability Testing Program. This program was aimed at studying the milder but more probable types of fuel and reactor malfunctions that could lead to accident sequence. In addition to preventing accidents, its aim was to better define the operating limits and tolerable faults in reactor operation, thus leading to both safer and more economical plants. The components of this program in EBR-II included tests of fuel to and beyond cladding breach, loss-of-coolant flow tests, mild power transients, and studies of man-machine interfaces.

In the early 1980s, ANL-W reexamined the basic design of liquid-metal-cooled fast reactors. The results of this study led to the Integral Fast Reactor (IFR) concept. The IFR incorporates four basic elements: sodium cooling; a pool configuration; a compact, integral fuel cycle facility; and a ternary metal alloy fuel. Modifications to the EBR-II and the HFEF/S facilities have been made to support the pyroprocessing and fuel manufacturing for the IFR demonstration project.

ANL-W has conducted shutdown and termination activities for the EBR-II. These shutdown activities included reactor defueling, draining of the primary sodium system (PSS) and secondary sodium system (SSS) and placing the EBR-II Complex (Bldgs 766, 767, and 795) in an industrially and radiologically safe shutdown condition. The Fuel Cycle Facility has been converted to a Fuel Conditioning Facility (FCF). The mission of the FCF is to electrochemically treat EBR-II fuel to create radioactive waste forms that are acceptable for disposal in a national geologic repository.

The ZPPR was put into operation at ANL-W in 1969. The ZPPR is large enough to enable core-physics studies of full-scale breeder reactors that will produce up to 1,000 megawatts. ZPPR has

also been used for mockups of metallic cores and space-reactor cores. ZPPR was placed in programmatic standby in fiscal year 1989.

Various chemical and radioactive wastes were generated from these three reactors and the support facilities at ANL-W. The operation of these facilities and the corresponding waste streams have been evaluated and documented in the ANL-W Waste Description document of 1973 (Draft) (reference 1). This document, which is based on process knowledge, has been used as an initial starting point for ANL-W cleanup activities.

6. ANL-W SITE CHARACTERISTICS

The ANL-W facility is found in the southeastern portion of the Idaho National Engineering and Environmental Laboratory (INEEL) (see Figure 6-1) and is responsible for a roughly rectangular-shaped administrative area encompassing approximately 890 acres.

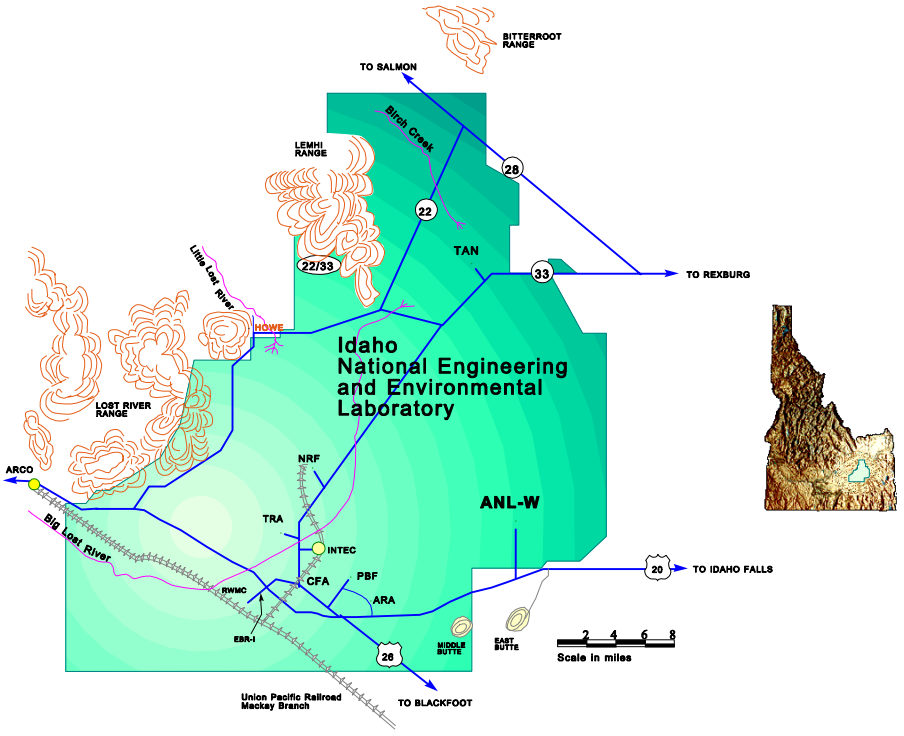

Figure 6-1: Idaho National Engineering and Environmental Laboratory (INEEL)

A double security fence with largest east-west and north-south dimensions of 580 m and 765 m (1,902 ft and 2,512 ft), respectively, surrounds the major portion of ANL-W. Located inside the fenced area are more than 60 buildings and 13 temporary trailers. Located outside the security fence are six buildings/facilities that support the ANL-W facility. Located on the ANL-W administrative area, but outside the security fence perimeter of ANL-W are unpaved roads, groundwater monitoring wells, the interceptor canal (diverts spring runoff and stormwater around the ANL-W facility for flood control), industrial waste pond, three old construction rubble burn areas, and borrow excavation pits used for construction at ANL-W facilities. All ANL-W facilities are within a local topographically closed basin. The surface of the facility slopes gradually from south to north, at approximately 30 ft per mile. Maximum topographic relief within the ANL-W administrative boundary is about 50 ft, ranging from 5,110 ft above mean sea level on the north boundary to 5,160 ft on a basalt ridge to the southeast.

The Twin Buttes are the most prominent topographic features within the INEEL and are found to the southwest of ANL-W. East and Middle Twin Buttes rise 1,100 and 800 ft, respectively, above the plain. Big Southern Butte, a composite acidic volcanic dome several miles south of the INEEL, is the most prominent single feature on the entire plain, rising approximately 2,500 ft above the level of the plain.

More detailed discussions of the ANL-W meteorology, geology and soils are provided in Appendix A of this document and can be found in reference 2.

6.1. SNAKE RIVER PLAIN AQUIFER

The Snake River Plain Aquifer (SRPA), the largest potable aquifer in Idaho, underlies the Eastern Snake River Plain and the INEEL. The aquifer is approximately 200 miles (322 km) long, 20 to 60 miles (32.2 to 96.5 km) wide, and covers an area of approximately 9,600 square miles (24,853 km^2). The depth to the SRPA varies from approximately 200 feet (61 m) in the northeastern corner of the INEEL to approximately 900 feet (274 m) in the southeastern corner. This change in groundwater depth in the northeastern corner to the southeastern corner occurs over a horizontal distance of 42 miles (67.6 km). Depth to groundwater is approximately 640 feet (195 m) below ANL-W and the groundwater flow direction is south-southwest.

Estimates show that nearly 2×10^9 acre-feet of water exist in the SRPA with water usage within the boundaries of the INEEL being approximately 5.6×10^3 acre-feet per year. From 1979 to 1994, the ANL-W withdrew an average of 138 million gallons of water per year from the SRPA. Principal uses of the water are for plant cooling water operations, boiler water, and potable water. On average, 85% of the water is discharged to either the Sanitary Sewage Lagoons or IWP, 13% is discharged to the air via cooling towers, and 2% is discharged to subsurface septic systems.

Regional flow in the SRPA is from northeast to southwest. Depth to the SRPA near the ANL-W facility is approximately 640 feet BLS based on 1995 water level measurements. Figure 6-2 shows the location of monitoring wells at and near the ANL-W facility and the groundwater flow direction. No permanent, natural surface water features exist near the ANL-W site. Recharge to the SRPA in the vicinity of ANL-W occurs as snowmelt or rain.

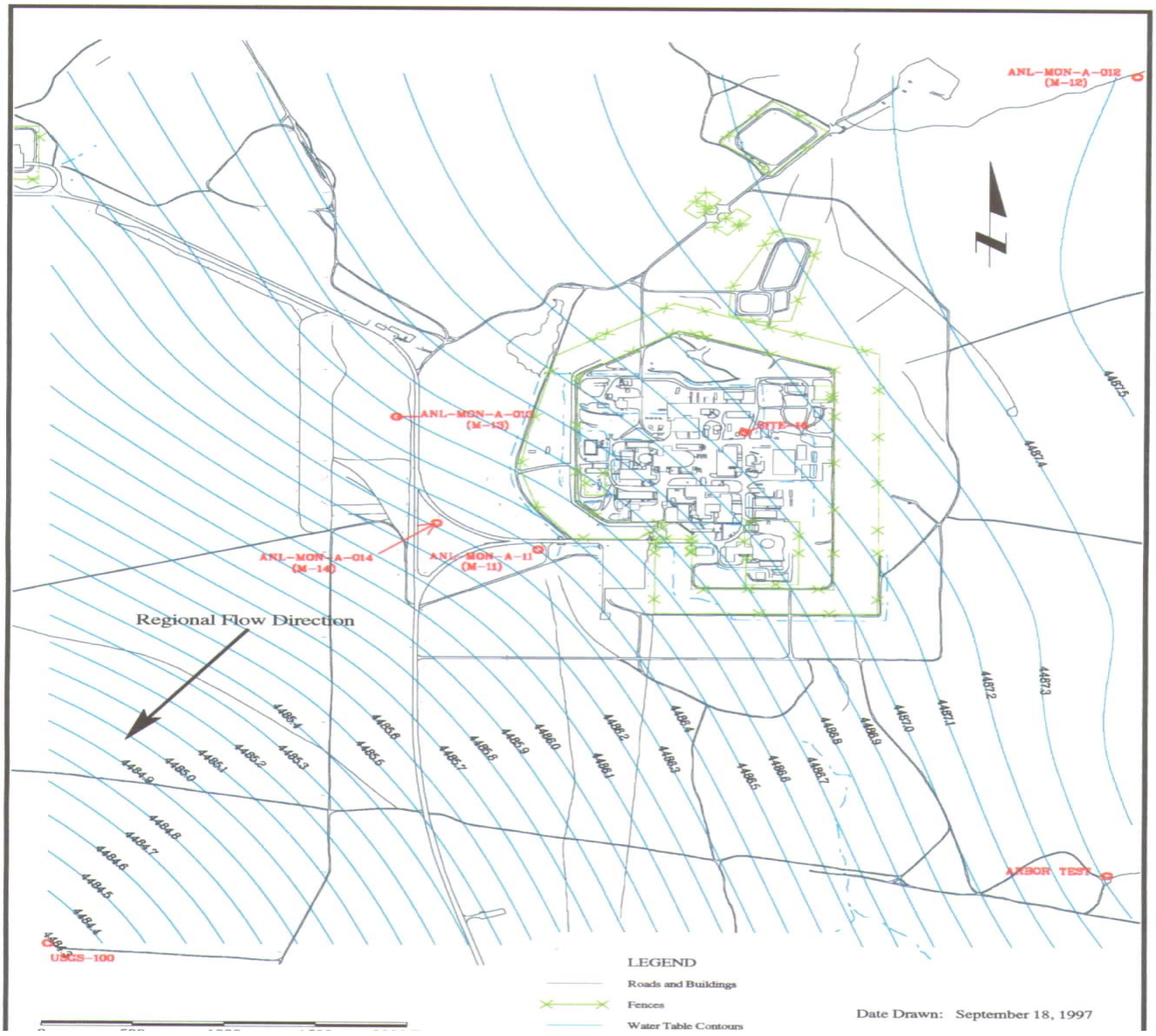

Figure 6-2: Location of Groundwater Monitoring Wells

Detrimental effects to the groundwater have not occurred nor have they been modeled to occur at the ANL-W facility from the contaminants identified during the evaluation of the CERCLA sites.

7. REGULATORY FRAMEWORK

7.1. WASTE SITES

7.1.1. COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

The ANL-W Waste Area Group 9 (WAG 9) is one of the INEEL WAGs identified in the Federal Facility Agreement and Consent Order (FFA/CO). The EPA issued a final ruling that listed the INEEL as a National Priorities List (NPL) site of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in November 1989. The FFA/CO was signed by the U.S. EPA Region 10, the Idaho Department of Health and Welfare (IDHW) and the DOE. Operable Unit (OU) 9-04 is listed as the "WAG 9 Comprehensive Remedial Investigation/Feasibility Study (RI/FS)", in the FFA/CO. The RI/FS assembled the previous investigations conducted for WAG 9, thoroughly investigated the sites not previously evaluated and determined the overall risk posed by the WAG.

The resulting comprehensive Record of Decision (ROD) document identifies five sites (containing eight contaminated areas) for remedial action (see Table 7-1). The ROD identifies 33 release sites (see Table 8-1) for "No Action" based on no risk to human health and the environment. The remedial actions have been chosen in accordance with the (CERCLA), of 1986, as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practical with the NCP.

Table 7-1: Remedial Action Sites

Waste Site	Contaminated Area
ANL-01	Industrial Waste Pond
	Ditch B (open portion)
	Ditch A
ANL-01A	Main Cooling Tower Blowdown Ditch
ANL-04	Sewage Lagoons
ANL-09	Interceptor Canal- Mound
ANL-09	Interceptor Canal-Canal
ANL-35	Industrial Waste Lift Station Discharge Ditch

The DOE, EPA and IDHW participated in the evaluation of remedial alternatives. The selected remedy and the contingent remedy (see sections 9.1.1 and 9.1.2, respectively) for the eight ANL-W areas of concern have been determined:

- to be protective of human health and the environment,

- to comply with federal and state requirements that are legally applicable or relevant and appropriate (applicable or relevant and appropriate requirements to the remedial actions), and
- to be cost effective.

The DOE, EPA and IDHW have concurred with the selected and contingent remedy for the clean-up of the eight ANL-W areas of concern (5 sites) and with the No Action determinations for the 33 remaining sites.

Additionally, as stated in the CERCLA ROD (reference 2), DOE will continue monitoring of the soil, air, vegetation, and groundwater for 20 years in accordance with DOE Orders and the ANL-W Environmental Monitoring Plan until 2018. These samples will be collected to ensure continued compliance of current discharges, to identify contaminant migration from potential CERCLA release sites and to ensure that CERCLA risk based modeling predictions remain valid.

The selected remedy of phytoremediation utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the selected remedy of phytoremediation will result in hazardous substances remaining on-site above levels for unrestricted use, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

The 5 sites that were retained for remedial action are the IWP and associated ditches (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal (ANL-09), and Industrial Waste Lift Station Discharge Ditch (ANL-35). It's anticipated that by the end FY 2002 phytoremediation activities for three of the five waste sites (ANL-01A, ANL-09, ANL-35) will be completed and long term monitoring (i.e., natural attenuation) instituted for (ANL-09). These activities are funded and managed by the DOE Environmental Management (EM) Program. In FY 2002 verification sampling will be performed to validate that the remediation remedy is functioning as designed.

In accordance with DOE's LTS Plan Guidance (draft April 17, 2001, section 3.1) (reference 3), the responsibilities for LTS of EM sites requiring long term remedial actions are to be transferred to the site landlord. It is assumed that included in this transfer will be the remaining two waste sites that have not commenced phytoremediation. At ANL-W, the transfer of responsibility from EM to NE for completion of all remaining (two waste sites) and ongoing environmental restoration activities under the CERCLA is scheduled for FY 2003.

The following are the expected final states of the EM sites located at ANL-W that are expected to transfer to NE, once all remedial actions are completed

Unrestricted Use Waste Sites

- Waste sites that were closed (administratively) through Environmental Protection Agency (EPA) Region X and the State of Idaho Department of Environmental Quality [IDEQ)] approval request by demonstrating that contamination does not exist above applicable action levels. These are "No Action" sites

- Waste sites for which remedial actions were completed through removal (excavation) or intrusion barriers (i.e., concrete) resulting in an unrestricted use designation. These are "No Further Remediation" sites.

Restricted Use Waste Sites

- Waste sites for which active remedial actions (i.e., waste soil removal or phytoremediation removal actions) are complete but operation and maintenance (O&M) and monitoring are ongoing because of the presence of residual contamination. Institutional controls are or will be required. These sites may be either "No Further Remediation" or may be "On-going Remediation" sites

Remedial actions for all the EM sites are not expected to be in place prior to transferring responsibility to NE. See Table 9-1 for the current status of sites at ANL-W. For example, the cleanup of several waste management units and equipment in the EBR-II Complex resulted in the complete removal of waste materials and contamination from many of these units. A number of units, however, still contain buried solid waste, contaminated environmental media (soil), and contaminated structural materials (concrete floors, walls, piping, etc.). Some of the incomplete waste units and facilities will require a significant effort to operate and maintain the remedial actions which will be put in place, to monitor for future releases from the units, and to prepare for any emergency release or failure of the units. Such efforts will be required for many years. Table 9-1 provides a status of the sites that are currently undergoing remediation or will in the future undergo remediation.

7.2. CONTAMINATED FACILITES

7.2.1. RESOURCE CONSERVATION AND RECOVERY ACT

On September 30, 1994, the EBR-II was taken to a subcritical configuration and shutdown and defueling operations began. Scheduled shutdown activities for EBR-II called for:

- complete removal and temporary storage of the reactor fuel (completed December 1996),
- drain and process the Na in both the PSS and SSS (completed March 2001), and
- maintain and place the entire reactor and related systems in an industrially and radiologically safe condition by the end of March 2002 (completed).

As a fast reactor, EBR-II was cooled with liquid Na. The reactor had both primary and secondary sodium cooling loops with a collective volume of about 100,000 gallons of sodium. The reactor had a thermal output of 62.5 megawatts and after heat transfer from the secondary sodium coolant loop to the adjoining steam power plant was able to produce 19 megawatts of electrical power. Both primary and secondary sodium coolant loops impurity levels were maintained at very low levels using simple sodium purification (cold-trap) systems. Associated with these systems were closed loops of sodium-potassium alloy (NaK) which served as heat sinks for purification purposes. Currently, the primary and secondary cooling loops are HWMA/RCRA interim status treatment/storage units containing residual quantities of sodium.

The 87,000 gal of Na in the primary coolant loop and the associated NaK in the primary-loop purification system became a HWMA/RCRA regulated waste on December 26, 1997. The 13,000 gal of Na in the secondary coolant loop and associated NaK in the secondary-loop purification system became waste shortly after the reactor was shut down and the secondary loop ceased transferring heat for power generation purposes (October 1, 1994).

DOE, in response to the Secretary of Energy and Congress, directed ANL-W to maintain the EBR-II PSS and SSS in an industrially and radiologically safe condition, and subsequently to complete the EBR-II Plant Closure (EPC) activities by March 2002. Part of the tasks for the HWMA/RCRA management of the residual sodium in the PSS and the SSS was to place these systems in stable configurations that can be easily maintained with minimal monitoring and maintenance, while HWMA/RCRA storage and treatment activities (removal and deactivation of sodium residuals) continue to be completed over several years. The process identified by ANL-W, and agreed upon by DOE, for reaching this stable configuration was the passivation of the sodium residuals. The EBR-II Plant Closure Project Implementation Plan (1) defined the EPC scope through March 2002, (2) defined industrially and radiologically safe and (3) provided the rationale for passivation of the sodium. Passivation of the sodium residuals results in the formation of a surface layer of sodium carbonate (Na_2CO_3) on all exposed sodium surfaces that will minimize effects on the residual sodium remaining in these systems against the unlikely event of uncontrolled intrusions of ambient air and/or water vapor. Passivation of the sodium residuals was completed under an Interim Status (40 CFR 265) treatment permit. As identified earlier, the EPC activities ended March 31, 2002, however, HWMA/RCRA treatment (removal and deactivation) and storage activities are continued beyond March 2002 under the ANL-W Infrastructure program.

7.2.2. DOE ORDER 430.1A, LIFE CYCLE ASSET MANAGEMENT

As DOE facilities complete mission operations and are declared excess, they pass into a transition phase that ultimately prepares them for disposition. The disposition phase of a facility's life cycle usually includes deactivation, decommissioning, and surveillance (including maintenance) and monitoring (S&M) activities.

The EBR-II Complex, which includes the Sodium Boiler Building (Bldg. 766), the Reactor Building (Bldg. 767) and Cover Gas Cleanup System (Bldg. 795), have been deactivated as required by this DOE Order. The purpose of the deactivation of the EBR-II Complex was to place it in an industrially and radiologically safe shutdown condition that is economical to

monitor and maintain for an extended period, until the eventual decommissioning of the facilities.

On March 31, 2002, a transition was made from placing the EBR-II Complex in an industrially and radiologically safe condition to a mission of maintaining the facility in a condition consistent with the Hazardous Waste Management Act/ Resource and Conservation Recovery Act (HWMA/RCRA) permit. This involves on-going activities in the EBR-II complex that pertain to S&M, as well as, activities to store and treat the remaining mixed waste governed under law.

8. LTS SITE DESCRIPTION

8.1. CERCLA WASTE SITES

The ANL-W WAG 9 is one of ten Idaho National Engineering and Environmental Laboratory (INEEL) WAGs identified in the Federal Facility Agreement and Consent Order (FFA/CO). Potential release sites identified at ANL-W facilities in the Federal Facility Agreement and Consent Order (FFA/CO) include wastewater structures and leaching ponds, underground storage tanks, rubble piles, cooling towers, an injection well, french drains, and assorted spills.

Eight areas at ANL-W have actual or threatened releases of hazardous substances, which, if not addressed by implementing the response action selected in the ROD document may present an imminent and substantial endangerment to human health or the environment. The ROD document identifies eight areas for remedial action and an additional 33 release sites for "No Action" based on the risk to human health and the environment (see Table 8-1 below).

The eight areas requiring remediation are subunits of five CERCLA sites (ANL-01, ANL-01A, ANL-04, ANL-09, and ANL-35) identified in the FFA/CO. These eight areas include the Sanitary Sewage Lagoons (ANL-04), Industrial Waste Pond, Ditches A, Ditch B, (all from ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Interceptor Canal-Canal and -Mound (sub-portions of ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35). The five CERCLA sites are described below and identified in Figure 8-1.

Industrial Waste Pond

The IWP (ANL-01) is an unlined, approximately 1.2-ha (3-acre) evaporative seepage pond fed by the Interceptor Canal and various industrial wastewater and stormwater drainage ditches. The pond was excavated in 1959, obtained a maximum water depth of about 4 m (13 ft) in 1988, and is still in use today. The pond is expected to go dry in 2002 or 2003 with the termination of cooling water discharges from the Sodium Process Facility. Contaminants of concern are cesium-137, chromium III, mercury, selenium, and zinc.

Ditch A

Ditch A (ANL-01) conveyed industrial wastewater from the EBR-II Power Plant auxiliary cooling tower to the IWP. Ditch A is still being used today to transport storm water runoff as well as intermittent auxiliary cooling tower waters. Discharges to Ditch A flow into the Main

Table 8-1: Summary of Wastes Sites Requiring Long-Term Stewardship

SWMU No.	Description	Human Health or Ecological Risk		Actual or *Expected* End State	Residual Contamination	Inspection	Operation	Maintenance	Monitoring[2]	Institutional Controls
		HH	E							
Sites Requiring Long-Term Operations and Maintenance and/or Institutional Controls										
ANL-01	Industrial Waste Pond	X	X	NFR[1]	Hazardous Constituents (Cr-III, Hg, Se, Zn) Radiological Constituent (Cs-137)		X		X	X
ANL-04	Sewage Lagoons		X	NFR	Hazardous Constituent (Hg)		X	X	X	X
ANL-09	Interceptor Canal-Canal	X		NFR	Radioactive Constituent (Cs-137)				X	X
ANL-09	Interceptor Canal-Mound	X		NFR	Radioactive Constituent (Cs-137)				X	
Sites Requiring Only Information Management										
ANL-01	Ditch A		X	NFR	Hazardous Constituent (Hg)					
ANL-01	Open portion Ditch B		X	NFR	Hazardous Constituents (Cr-III, Zn)					
ANL-01A	Main Cooling Tower Blowdown Ditch		X	NFR	Hazardous Constituents (Cr-III, Hg)					
ANL-35	Industrial Waste Lift Station Discharge Ditch		X	NFR	Hazardous Constituent (Ag)					
ANL-01	Buried portion Ditch B			NA[2]						
ANL-01	Ditch C			NA						
ANL-05	ANL Open Burn Pits #1			NA						
ANL-05	ANL Open Burn Pits #2			NA						
ANL-05	ANL Open Burn Pits #3			NA						
ANL-08	EBR-II Leach Pit (Radioactive)			NA						
ANL-10	Dry Well between T-1 and ZPPR Mound			NA						
ANL-11	Waste Retention Tank			NA						
ANL-12	Suspect Waste Retention by 793			NA						
ANL-14	Septic Tank and Drain Fields (2) by 753			NA						
ANL-15	Dry Well by 768			NA						
ANL-16	Dry Well by 759 (2)			NA						
ANL-17	Dry Well by 720			NA						
ANL-18	Septic Tank and Drain Field by 789			NA						
ANL-19	Sludge Pit West of T-7 (Imhoff Tank)			NA						

SWMU No.	Description	Human Health or Ecological Risk		Actual or *Expected* End State	Residual Contamination	Inspection	Operation	Maintenance	Monitoring(2)	Institutional Controls
		HH	E							
Sites Requiring Only Information Management (continued)										
ANL-20	Septic Tank and Drain Field by 793									
ANL-21	TREAT Suspect Waste Tank and Leaching Field (Non-Radioactive)			NA						
ANL-22	TREAT Septic Tank and the current Leaching Field			NA						
ANL-23	TREAT Seepage Pit and Septic Tank West of 720			NA						
ANL-24	Lab and Office Acid Neutralization Tank			NA						
ANL-25	Interior Building Coffin Neutralization Tank			NA						
ANL-26	Critical Systems Maintenance Degreasing Unit			NA						
ANL-27	Plant Services Degreasing Unit			NA						
ANL-28	EBR-II Sump			NA						
ANL-29	Industrial Waste Lift Station			NA						
ANL-30	Sanitary Waste Lift Station			NA						
ANL-31	Industrial/Sanitary Waste Lift Station (Ind.Side Not Used)			NA						
ANL-32	TREAT Control Bldg. 721 Septic Tank and Leach Field			NA						
ANL-33	TREAT Control Bldg. 721 Septic Tank and Seepage Pit			NA						
ANL-34	Fuel Oil Spill by Building 755			NA						
ANL-36	TREAT Photo Processing Discharge Ditch			NA						
ANL-53	Cooling Tower Riser Pits			NA						
ANL-60	Knawa Butte Debris Pile			NA						
ANL-61	EBR-II Transformer Yard			NA						
ANL-61A	PCB-contaminated soil (Adjacent to ANL-61)			NA						
ANL-62	Sodium Boiler Building (766) Hotwell			NA						
ANL-63	Septic Tank 789-A			NA						

(1) NFR – No Further Remediation

(2) No Action (NA) - Sites that are unrestricted. LTS responsibilities include groundwater monitoring through 2018 and record keeping

Figure 8-1: Remedial Waste Sites

Cooling Tower Blowdown Ditch and ultimately into the IWP. The contaminant of concern is mercury.

Ditch B

Ditch B was also used to transport storm water runoff as well as wastewater from the EBR-II Power Plant and the Fire Station (Bldgs. 768 and 759) to IWP. Ditch B consists of two portions; an open portion and buried portion. The open portion consists of a small 125 feet portion of

Ditch B that is still being used today. The buried portion (1,275 feet) of Ditch B was backfilled with clean soil to a depth of approximately 5-feet. This backfill operation occurred during the installation of a second (outer) security fence in 1976. Contaminants of concern are chromium III and zinc.

Main Cooling Tower Blowdown Ditch

The Main Cooling Tower Blowdown Ditch (ANL-01A) flows north on the westside of the Main Cooling Tower and then north between the security fences to the IWP. It is an unlined channel approximately 700 feet in length and 3 to 15 feet wide. From 1962 to 1996, the ditch had been utilized to convey industrial wastewater from the Cooling Tower to the IWP. The main sources of nonradioactive impurities to the IWP were water treatment chemicals used for the regeneration of ion exchange resin beds and also the extracted minerals from cooling tower water used in the EBR-II steam system. From 1962 to July 1980, a chromate-based corrosion inhibitor was added to the Cooling Tower water and the resulting " blowdown" water contained significant quantities of hexavalent chromium. In the EBR-II Power plant, ion exchange column regeneration discharges occurred from 1962 to March 1986. Regeneration of these columns was accomplished with sulfuric acid (for cation columns) and sodium hydroxide (for anion columns). The Power Plant periodically discharged acidic liquids to the Main Cooling Tower Blowdown Ditch until 1986. Contaminants of concern are chromium III and mercury.

Sewage Lagoons

The sanitary Sewage Lagoons (ANL-04) are located north of the ANL-W facility. Two lagoons were constructed in 1965, with a third built later in 1974. The three sanitary sewage lagoons cover approximately two acres. The three lagoons dimensions are; (1) 150 x 150 x 7 feet, (2) 50 x 100 x 7 feet, and (3) 125 x 400 x 7 feet. The lagoons receive all sanitary wastewater originating at ANL-W, with the exception of the Transient Reactor Test Facility, Sodium Process Facility, and the Sodium Components Maintenance Shop. Sanitary waste discharged is from rest rooms, change facilities, drinking fountains, and the Cafeteria. The three lagoon bottoms are sealed with a 0.125 to 0.25-inch layer of bentonite and are situated approximately 640 feet above the groundwater. The Sewage Lagoons are still in use and will continue to be used for disposal of sanitary wastes for an estimated 34 years (until 2033). The contaminant of concern is mercury.

Interceptor Canal-Canal

The canal portion was used to transport industrial wastewater to the IWP and to divert spring runoff and stormwater around the ANL-W facility for flood control. Between 1962 and 1975, two 4-in. pipes transported liquid industrial wastes and cooling tower effluent, to the Interceptor Canal. One line transported cooling tower blowdown water and regeneration effluent while the other line originated at the Industrial Waste Lift Station (Bldg. 760) an transported industrial wastes. Liquid radioactive wastes were discharged through the same line as the industrial wastes, but they were diverted to the EBR-II Leach Pit. Discharge of industrial wastes was discontinued in 1973, and discharge of cooling tower blowdown water to the canal was discontinued in 1975. The canal still serves as a diversion ditch for spring runoff and stormwater. The contaminant of concern is cesium-137.

Interceptor Canal-Mound

During clean out operations at the Interceptor Canal in October 1969, abnormal background radioactivity was detected. Additional radiation surveys in 1969, 1973, and 1975 indicated that the entire length of the Interceptor Canal was contaminated. Approximately 1,810 yd^3 of this soil remains in a 500 ft long mound located immediately to the west of the canal. This mound of soil is the ANL-09-Interceptor Canal-Mound and was investigated as part of the RI/FS process. The mound is approximately 500 ft. long 20 ft. wide and 4 ft. deep. The contaminant of concern is cesium-137.

Industrial Waste Lift Station Discharge Ditch

The Industrial Waste Lift Station Discharge Ditch (ANL-35), also known as the "North Ditch", is located inside the ANL-W security fences. The ditch is approximately 500 feet in length with a bottom width of 3 to 4 feet. At any given time, there is approximately 2 to 3 inches of water in the ditch. The ditch receives industrial waste water, primarily cooling water and photo processing wastes (e.g., photo developers, fixers, and stabilizers, and acids). Historical discharges included several retention tank overflows that may have contained ethanol, sodium hydroxide, and some radionuclides from a variety of facilities at ANL-W. The contaminant of concern is silver.

The selected remedy for the IWP and associated Ditches (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal (ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35) is phytoremediation. Phytoremediation is the generic term for "phytoextraction" an innovative/emerging technology that utilizes plants to extract the contaminants from the soil. Phytoremediation will be conducted insitu to remove the metals and radionuclides from the soils via normal uptake mechanisms of the plants.

The selected remedy for sites radioactively contaminated will be by natural attenuation. This is to occur over approximately 100 years (through 2098).

8.2. CONTAMINATED BUILDINGS

To meet regulatory requirements and in agreement with the Idaho State Department of Environmental Quality (IDEQ) a HWMA/RCRA treatment and storage operation permit application for the EBR-II Complex was submitted to the IDEQ in September 2001. The EBR-II Complex consists of Buildings 766, 767, and 795. These buildings house the equipment that contain the primary and secondary Na and NaK. This permit, when received will replace the Interim Status permit under which these facilities (see Table 8-2) are currently operated. Under Interim Status (Part A Permit), the hazardous waste treatment authority is limited to passivation of the primary and secondary sodium systems. Receipt of the HWMA/RCRA operating permit (Part A and Part B Permit) from the State of Idaho will allow the continued storage of sodium and sodium contaminated components and provide the authority and responsibility for completing treatment of the sodium (including contaminated components) by described deactivation methods.

Table 8-2: Contaminated Facilities Requiring Long-Term Stewardship

Description	Status	Completed Actions	Residual contamination	Surveillance	Maintenance
Incomplete Project Requiring Long-Term Surveillance and Maintenance					
Bldg. 766 (Sodium Boiler Building)	In S&M	Passivated(1)	Na, NaK, radioactive contaminants	X	X
Bldg. 767 (EBR-II Reactor Building)	In S&M	Passivated	Na, NaK, radioactive contaminants	X	X
Bldg. 795 (Cover Gas Cleanup Building	In S&M		Na, radioactive contaminants	X	X

(1) Passivated: A protective carbonate layer formed on surfaces of residual sodium

The operating permit provides a time period of approximately 20 years for ANL-W to remove and deactivate sodium and sodium wetted components leading to HWMA/RCRA clean closure of the facility. The removal and deactivation activities specified in the permit clearly show that the EBR-II facility will be an active treatment and storage unit. To meet HWMA/RCRA clean closure performance standards, systems must be deactivated and flushed of HWMA/RCRA regulated materials, or removed from the facility. The EPC transition document (reference 4) identifies the systems with residual sodium or sodium wetted components and provides a basic description of the original function. A current status is also provided with the anticipated actions and estimated duration to complete HWMA/RCRA closure, treat waste generated by this process and dispose of that waste.

Some systems will not undergo in-situ deactivation due to presence of bulk quantities of sodium or inaccessibility of the sodium. For those systems not undergoing in-situ sodium deactivation, ANL-W will remove the ancillary equipment containing sodium to a permitted unit for treatment.

The duration estimates provided in reference 4 are preliminary and focus on major activities. The duration estimates are for a “Planning” basis only and not to establish a baseline. A baseline

will be generated when supplemental Infrastructure funding is established for HWMA/RCRA treatment, storage and closure.

9. REMEDIAL ACTION PROGRAM

9.1. WASTE SITES

The Record of Decision (ROD) for WAG 9, signed on September 29, 1998, identified that eight areas within five solid waste management units (SWMUs) would undergo remediation until Remediation Goals (RGs) are met (see Table 9-1). To meet the RGs, DOE identified a selected remedy of phytoremediation and a contingent remedy of excavation and disposal. The initial and long-term use of the phytoremediation as the remedy depended on the success of the bench- and field-scale tests, respectively. These tests were successful and ANL-W implemented the field scale phytoremediation. The main criteria for selection of phytoremediation for ANL-W was to remediate the sites within a reasonable period of time and at a reasonable cost. ANL-W used seven years as a reasonable time period for phytoremediation. DOE implemented the contingent remedy of excavation and disposal for two sites at ANL-W in 1999. It was determined that two waste sites exceeded the seven year time period and that these two sites would undergo excavation. These sites were (1) the open portion of Ditch B (ANL-01) and the Main Cooling Tower Blowdown Ditch (ANL-01A). DOE prepared an Explanation of Significant Difference (ESD) prior to the implementation of the contingent remedy. Disposition of the soil was to a nonradioactive landfill on the INEEL.

Table 9-1: Waste Sites Requiring Remedial Actions

SWMU No.	Description	Remediation Activity(1)	Status	Estimated or Actual completion of Remedial Activities
ANL-01	Industrial Waste Pond	P & D	Begin in FY 2003	FY 2010 (P); FY 2108 (D)
	Ditch A	P	ongoing	FY 2002
	Open portion Ditch B	E	ongoing	FY 1999 (E):
ANL-01A	Main Cooling Tower Blowdown Ditch	E & P	ongoing	FY 2000 (E), FY 2002 (P)
ANL-04	Sewage Lagoons	P	Begin in FY 2033	FY 2049
ANL-09	Interceptor Canal-Canal	D	ongoing	FY 2087
	Interceptor Canal-Mound	P & D	ongoing	FY 2002 (P); FY 2104 (D)
ANL-35	Industrial Waste Lift Station Discharge Ditch	P	ongoing	FY 2002

(1) E= Excavation; P=Phytoremediation; D=Decay by natural attenuation

The December 8, 1998, Remedial Design/Remedial Action Scope of Work for Waste Area Group 9 document (reference 5) describes in detail the working schedule for remedial activities and strategy for remedial design. This draft Remedial Design report describes (in detail) the specifications for implementing the selected and contingent remedial action at these eight sites.

The Main Cooling Tower Blowdown Ditch (ANL-01A) was originally included as a Land Disposal Unit under the RCRA Consent Order and Compliance Agreement (COCA) on the basis that corrosive liquid wastes were discharged after 1980. DOE, EPA and IDHW WAG 9 managers determined that the Main Cooling Tower Blowdown Ditch was a HWMA/RCRA Land Disposal Unit. The Managers determined that the remediation would be under the CERCLA process in accordance with the applicable substantive requirements of HWMA/RCRA, if determined that there existed an unacceptable risk to human health or the environment. However, the FFA/CO has only adopted RCRA corrective action (3004 (u) & (v)), and not HWMA/RCRA closure. Therefore, upon completion of the remedial action, the DOE must receive approval from the IDEQ Director that the Main Cooling Tower Blowdown Ditch has been closed pursuant to HWMA/RCRA closure requirements.

9.1.1. PHYTOREMEDIATION (SELECTED REMEDY)

Phytoremediation is the selected remedy for the following sites: IWP and associated Ditches (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal (ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35). Phytoremediation, a generic term for "phytoextraction", is an innovative/emerging technology that utilizes plants to extract the contaminants from the soil. Phytoremediation will be conducted insitu to remove the metals and the radionuclides from the soils via normal uptake mechanisms of the plants. The plant vegetation is then harvested, sampled, and shipped to either a radioactive or nonradioactive landfill on the INEEL. Phytoremediation would not be initiated on the Sanitary Sewage Lagoons (ANL-04) until approximately 2033, when the ANL-W facility is scheduled for closure. The start of the phytoremediation for the IWP (ANL-01) will not be initiated until the cooling water discharges from the Sodium Processing Facility (SPF) are completed. The final SPF cooling water discharges are planned for 2003. The startup delay for implementing phytoremediation for either site does not present any potential increase in the risks to human health and/or the environment.

The effectiveness and technical implementation of phytoremediation are very site-specific. Sample results of the ANL-W site show that contaminants are predominantly bound in the upper foot of soils. Thus, most of the contaminants are already within the plant root zone and no major movement of soil is necessary. The plants would require additional irrigation and soil amendments. The plant stalks, along with the wetted soil condition, would help control the spread of windblown contaminants. DOE conducted a bench-scale testing of soils in 1998 to determine applicability of this remedial alternative. DOE has tested nonnative INEEL plant species for their applicability for phytoremediation. Where nonnative weedy plants are grown, they will be harvested before they go to seed.

It is anticipated that phytoremediation will remove contaminants to acceptable levels after six field seasons. These acceptable levels are defined by the Remedial Action Objectives (RAOs) for contaminated soils at ANL-W (reference 5). Phytoremediation will eliminate the need for long-term monitoring and maintenance activities, surface water diversions, land use and access restrictions after 100 years, and long-term environmental monitoring (air, sediment, and groundwater). The major components of the selected remedy for ANL-W that have been completed, partial completed or in need of completing are:

Major Components Completed

- Completed phytoremediation workplan for field-scale testing.
- Conducted field-scale phytoremediation test of selected plant species at the sites that pose unacceptable risks.
- Determined the effectiveness and implementability of phytoremediation based on results of field-scale testing.
- Completed three seasons of phytoremediation planting and harvesting at four contaminated sites.

Major Components to be Completed

- Collect soil and plant samples to be used to validate the completion of phytoremediation on three sites. Scheduled for summer of FY 02.
- Harvesting, compacting, and disposing of the above- and below-ground plant matter that will be sent to a permitted landfill.
- Continuing the planting/harvesting process for phytoremediation. This process would continue until RAOs are attained.
- Installing access restrictions, consisting of fences, bird netting, and posting warning signs.
- Reviewing the remedy no less than every five years from the signature of the ROD until the year 2098
- Implementing DOE controls that limit residential land use for at least 100 years (through FY 2098).

9.1.2. EXCAVATION (CONTINGENT REMEDY)

If it is determined that the selected remedy of phytoremediation does not adequately reduce the principle risks to human health and the environment after completion of the two-year field season, a contingent alternative of excavation and disposal has been selected. The contingent remedy of excavation and disposal would be used to remove contaminated soils from the IWP and associated ditche (ANL-01); Main Cooling Tower Blowdown Ditch (ANL-01A); Sanitary Sewage Lagoons (ANL-04); Interceptor Canal-Mound (ANL-09); and the Industrial Waste Lift Station Discharge Ditch (ANL-35). The disposal location, on the INEEL, for these contaminated soils will be to either the INEEL CFA landfill (nonradioactive) or the Radioactive Waste Management Complex (RWMC) landfill for soils containing radioactive contamination. Excavation and disposal activities would not be initiated on the Sanitary Sewage Lagoons (ANL-04) until approximately 2035 when ANL-W is scheduled for closure. The start of the phytoremediation for the IWP (ANL-01) will not be initiated until the cooling water discharges from the SPF are completed. The final SPF cooling water discharges are planned for 2003. This delay in excavation and disposal startup for either site will not pose any increase in the risks to human health and/or the environment.

The major components of the contingent remedy for ANL-W are:

- Contaminants in the waste areas will be excavated and transported to either the RWMC or INEEL CFA landfill for on-INEEL disposal.
- Verification sampling would be used to validate that the remaining soil concentrations are below the RAOs.
- Review of the remedy no less than every five years from the ROD signature until the year 2098.
- Implementation of DOE controls that limit residential land use for at least 100 years (through FY 2098).
- The no action alternative is reaffirmed and selected as the appropriate alternative for the remaining 33 areas at ANL-W. These 33 areas have risks that are at acceptable levels based on the information gathered during the remedial investigation.
- The possibility exists that contaminated environmental media (not identified by the INEEL FFA/CO or in this comprehensive investigation) will be discovered in the future as a result of routine operations, maintenance activities, and decontamination and dismantling activities at ANL-W. Upon discovery of a new contaminant source by DOE, IDEQ, or the EPA, that contaminant source will be evaluated and appropriate response action taken in accordance with the FFA/CO.

9.1.3. INSTITUTIONAL CONTROLS

The institutional controls described below and identified in Table 9-2 are measures that will prevent inadvertent human or animal exposure to residual contaminants remaining in the waste sites at ANL-W that have or will undergo a remedial action. These measures include posted warning signs, permanent markers, procedures, training and legal land use restriction documents filed with local government agencies. Table 9-3 identifies the controls that DOE will have in-place, while under DOE's control to meet the institutional controls required by the ROD.

These measures will be applied to those waste areas that retain sufficient amounts of contaminants after remedial actions to prevent unrestricted use of the areas by future workers, residents or ecological receptors. The institutional controls are being implemented at ANL-W for the waste sites to comply with the Environmental Protection Agency Region 10 draft Guidelines for Institutional Controls as part of CERCLA remedies under the INEEL FFA/CO.

Public access to all waste sites requiring remedial activities is currently restricted by posting and by fencing in some cases. All waste sites are on federal property where residential development is prohibited. Sites ANL-01A and ANL-35 are located entirely within security fencing at ANL-W. Ditches A and B of ANL-01 are also located within the security fencing. Only persons conducting official business with the Department of Energy are allowed to enter the fenced perimeter of the ANL-W site or to access the areas surrounding ANL-W. All federal and contractor employees are required to successfully complete General Employee Training prior to working at the ANL-W facility. This training addresses warning signs, barriers, and work control requirements to prevent workers from exposure to radiological and chemical contaminants at ANL-W facilities, including the WAG 9 waste

Table 9-2: Institutional Controls Required by the ROD

Waste Site	Waste Site Name	Timeframe of Land Use Restrictions (from 1999)	Review Period	Institutional Controls
ANL-01	Industrial Waste Pond	Max of 110 years is expected	5 year	Access restrictions (e.g. fences, posted signs, permanent markers) to prevent residential intrusion. Periodic inspection & maintenance to ensure integrity of institutional controls.
	Ditch B (open portion)	Completed excavation in FY99	5 year	Maintain existing fencing and access controls until remedy is complete.
	Ditch A	Expected to be 5-7 years	5 year	Maintain existing fencing and access controls until remedy is complete.
ANL-01A	Main Cooling Tower Blowdown Ditch (West)	Expected to be 5-7 years	5 year	Maintain existing fencing and access controls until remedy is complete.
ANL-01A	Main Cooling Tower Blowdown Ditch (East)	Completed excavation in FY99	5 year	Maintain existing fencing and access controls until remedy is complete.
ANL-04	Sewage Lagoons	Max of 50 years expected	5 year	Maintain existing fencing and access controls until remedy is complete. Maintain water in lagoons to prevent risk to ecological receptors (burrowing mammals) until remedy is complete.
ANL-09	Interceptor Canal- Mound	Max of 105 years is expected	5 year	Access restrictions (e.g. fences, posted signs, and permanent markers) to prevent residential intrusion. Periodic inspection & maintenance to ensure integrity of institutional controls.
ANL-09	Interceptor Canal-Canal	Max of 88 years is expected	5 year	Access restrictions (e.g. fences, posted signs, and permanent markers) to prevent residential intrusion. Periodic inspection & maintenance to ensure integrity of institutional controls.
ANL-35	Industrial Waste Lift Station Discharge Ditch	Expected to be 5-7 years	5 year	Maintain existing fencing and access controls until remedy is complete.

Table 9-3 Controls during DOE Operations and Post Operations under DOE Control

Restriction	Land Use Objectives	Controls	Controls Procedures	Surveillance to Assure Controls In-Place	Surveillance Procedures	Response to Failed Controls
Prevent Excavation on or within 50 Meters of Industrial Waste Pond, Interceptor Canal-Canal and -Mound sites (ANL-01,09)	Prevent current and future worker and resident exposure to radioactively contaminated soils.	Access Restrictions include fences, and posted signs warning against excavation.	DOE Radiation Control Manual for radioactive contamination and exposure. DOE Environmental Checklist process. Security Procedures for ANL-W. ANL-W ES&H Excavation permit Procedure.	Annual inspection to ensure integrity of existing fences and signs until first 5-year review. Further inspections every 5 years until determined by 5-year review to be no longer needed.	Use 5-year Site-Specific Inspection Form in OU 9-04 O&M Plan	Perform maintenance to signs, permanent markers, and fencing as needed. Attach documentation of maintenance activities to 5-year Site-Specific Inspection Form. Activation of security procedures for responding to trespassing. Replace any excavated soil back into excavation.

sites. All workers must complete this training, whether working inside or outside the ANL-W security fence. In April of 1999, the eight areas of concern were posted to identify risks posed by long-term occupational exposure to the radionuclide contaminants or to identify the sites as undergoing phytoremediation.

At any time before Remedial Action Objectives are met, DOE (or the responsible land agency) must provide written notice to the following offices before sale or lease of lands that are WAG 9 waste sites which have undergone remedial action:

Remediation Project Manager
U.S. Environmental Protection Agency Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Federal Facility Agreement Consent Order Project Manager
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706

This written notice must specify by legal description which lands are being sold or leased, and the likely potential future use of the property. This notification requirement also applies to the sale or lease of lands that are within 50 meters of WAG 9 waste sites which have undergone remedial action.

Institutional Control monitoring reports will consist of the 5-year Inspection Forms in the OU 9-04 Operations and Maintenance Plan (reference 5), together with documentation of any maintenance or repair work performed on the controls. These reports must be sent to the Offices listed above as part of the CERCLA 5-year review process:

The Department of Energy (or responsible land agency) will also immediately report any activity that is inconsistent with the Institutional Control Objectives to the above offices. This reporting is required at any time such an activity is discovered at WAG 9.

9.2. EBR-II COMPLEX

The activities necessary to achieve radiological and industrial safe conditions are described and approved in the "EBR-II Plant Closure Implementation Plan," (reference 6).

The first phase of the EPC was the removal of fuel from the EBR-II reactor. Fuel removal commenced in October 1994 and was completed in December 1996. The second phase of the EBR-II plant closure includes the steps required to drain the bulk sodium from the primary and secondary sodium systems and convert the sodium coolant into a waste form suitable for disposal.

The final phase of the EBR-II plant closure provided the requirements for and completed the lay-ups of appropriate reactor and non-reactor systems. Included as part of the system lay-up

activity was the stabilization of residual amounts of sodium in the primary, secondary and support systems.

As described in the referenced Implementation Plan, not all of the reactive metals have been removed from plant systems. To meet regulatory requirements and in agreement with the Idaho State Department of Environmental Quality (IDEQ) a HWMA/RCRA treatment and storage operation permit application was submitted to the IDEQ in September 2001. This operating permit, when received will replace the Interim Status permit under which these facilities are currently regulated. Under Interim Status (Part A Permit), the hazardous waste treatment authority is limited to passivation of the primary and secondary sodium systems. Receipt of the HWMA/RCRA operating permit (Part A and Part B Permit) from the State of Idaho will allow the continued storage of sodium and sodium contaminated components and provide the authority and responsibility for completing treatment of the sodium (including contaminated components) by described deactivation methods.

The HWMA/RCRA storage and treatment tasks identified for placing the primary and secondary coolant systems in an industrially and radiologically safe condition are tasks 1 and 2 below in Table 9-4. Tasks 1 and 2 have been completed. Tasks 3 and 4 are required to meet HWMA/RCRA permitting requirements and completed in the next 20 years. Below are summary discussions of the remedial tasks. Detailed information on these tasks are provided in (1) the EBR-II HWMA/RCRA Permit Application (reference 7) and (2) the EBR-II Transition Planning document (reference 4).

Table 9-4: HWMA/RCRA Storage and Treatment Activities for the EBR-II Complex

(1)	Drain bulk Na and NaK from the primary and secondary coolant systems.
(2)	Replace argon cover gas with dry CO_2
(3)	In-situ Deactivation of Na
(4)	Removal of Ancillary Equipment containing Na or NaK

9.2.1. BULK NA AND NAK REMOVAL

A necessary step in placing the EBR-II Complex in an industrially and radiologically safe condition was the removal of bulk primary and secondary Na and NaK (contained in the emergency shutdown coolers) from the facility. The removal of Na and NaK was accomplished through heated pipeline transfers from EBR-II facilities to the Sodium Process Facility (SPF). The SPF was used to convert radioactively contaminated Na and NaK to a non-HWMA/RCRA low-level radioactive waste. The non-HWMA/RCRA low-level radioactive waste, in the form of sodium and/or potassium hydroxide, was sealed in 71-gal drums and ultimately disposed of in the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering and Environmental Laboratory. This was completed in March 2001.

9.2.2. COVER GAS CONVERSION

An argon gas blanket, in the primary and secondary coolant loops, was provided above the sodium free surfaces. The argon gas blanket was replaced with dry carbon dioxide (CO_2) gas starting in CY 2001. This change in the cover gas was necessary for preparation for the deactivation of sodium residuals.

9.2.3. DEACTIVATION

For the primary and secondary coolant loops (including the Intermediate Heat Exchanger (IHX)), residual radioactive Na will be reacted with moist CO_2 to form sodium carbonate (Na_2CO_3) and/or sodium bicarbonate ($NaHCO_3$). The reaction process will be monitored for O_2 and H_2 to assure that a flammable or explosive mixture is not developing during deactivation. After converting the sodium to Na_2CO_3 and/or $NaHCO_3$, the tank systems will be water rinsed to remove the treatment residues. The treatment residues will be disposed of in a appropriate Subtitle D landfill. It shall be understood that all references to Na_2CO_3 in this document includes $NaHCO_3$.

9.2.4. COMPONENT REMOVAL

ANL-W will remove ancillary equipment (e.g., piping, components, etc.) containing Na or NaK, that ***will not*** undergo insitu deactivation, to a permitted storage unit for further treatment. It will be necessary to remove sections (i.e., dead legs containing sodium, capillary tubes containing NaK) prior to insitu deactivation and certifying the completion of the closure of the primary and secondary Na and NaK systems.

10. LTS IMPLEMENTATION

10.1. OPERATION AND MAINTENANCE

A brief description of the on-going remediation efforts for the CERCLA waste sites at ANL-W is provided in this section. Detailed discussions can be found in Operable Unit 9-04 “Final Remedial Design”, (reference 5).

10.1.1. PHYTOREMEDIATION

The main criteria for selection of phytoremediation for ANL-W waste sites was to remediate the sites within a reasonable period of time. ANL-W used seven years as a reasonable time period for phytoremediation

The plants actual uptake results from the bench-scale tests for cesium-137 and the five inorganics in the ANL-W soils were used to determine the number of years of phytoremediation necessary to remediate the sites. It was determined that the chromium remediation in the east portion of the Main Cooling Tower Blowdown Ditch and open portion of Ditch B would require more than 10 years to meet the remediation goals. These two areas were remediated using the contingent remedy of excavation with on-INEEL disposal.

Operations for phytoremediation implementation consists of preplanting, planting, irrigation, harvesting, and postharvesting. Below is a summary discussion of these activities.

Pre-planting activities: This activity occurs once prior to the initial growing season for the waste site. As previously identified, only two sites remain that will require this task, the IWP and the sanitary sewage lagoons. Pre-planting activities involve grubbing of currently existing vegetation, grading, removing rock, installing irrigation lines, and installation of fences and signs.

Planting Activities: This is the planting of 3-, 4-, and 5-ft tall bare-root willow plants or planting koshia seeds.

Irrigation: To optimize the biomass of the willow plants and koshia plants, supplemental irrigation is installed to keep the soil moisture content in the optimum growing range. The optimum moisture content is roughly estimated to be between 40-50% based on discussions from representatives with the United States Department of Agriculture (USDA). The system can be adjusted to optimize the moisture content needed by the plants to the actual site being remediated. To accomplish this, moisture detectors are installed that will automatically turn on or shut off the irrigation when the soil moisture varies outside these levels. Two moisture detectors are stacked vertically at depths of 1.0 and 1.5 ft. The automatic watering switch is installed on the detector located at the 1.0 ft depth. This "trains" the willow plant roots to stay within the contaminated zone as they seek out the water. The lower moisture detector is used to show that irrigation has not leached the contaminants below the contaminated zone.

Harvesting: Harvesting willows is accomplished by uprooting the trees and making them into wood chips. Disposition of the wood chips is to a compactable (4 x 4 x 6 ft) box. When the box is full the box will be moved to a staging area for labeling and radiological surveying, and await shipment to either the INEEL CFA landfill or the RWMC facility.

The koshia plants are harvested as soon as the first flowers on the plants are evident, which will prevent seeds from developing and prevent the release of koshia seeds across the INEEL Harvesting of the koshia consists of mowing, raking and finally bailing the plants. After the bailing is completed a two-row potato digger is used to lift the roots to the surface. When all koshia roots have been lifted and dried, the roots are baled. Disposition of the koshia plants is the same as for the willows

Postharvesting: After each field season, postharvesting activities are initiated that includes regrading the soils and preplanting koshia plants. The koshia seeds for the first crop the following year are planted in the fall and covered with a thin layer of soil. The koshia will then be able to sprout and grow as soon as site conditions warrant. This increases the growing season for the second year and increases the biomass of the koshia produced.

Revegetation

Reseeding will be performed only at the ANL-W Interceptor Canal-Mound site. This will occur upon completion of the phytoremediation activities. This site is located west of ANL-W outside

the security fences. The irrigation system at the Interceptor Canal-Mound will remain inplace and active while the revegetation activities are being completed. DOE and ANL-W anticipate that it would only take one to two years of supplemental watering to establish a successful revegetation of the Interceptor Canal-Mound.

10.1.2. EBR-II COMPLEX

As a HWMA/RCRA treatment and storage facility, the EBR-II Complex will be performing the insitu treatment and component removals (see section 9.2.3 and 9.2.4, respectively). To meet HWMA/RCRA final clean closure performance standards, systems must be deactivated and flushed of HWMA/RCRA regulated materials, or removed from the facility. These operations provide for meeting the regulatory intent of an active HWMA/RCRA treatment and storage facility.

In addition to the treatment and component removal operations, additional operations and maintenance activities to meet HWMA/RCRA tank and container regulatory requirements for a permitted treatment and storage unit are:

- Operation of tank equipment, instrumentation and secondary containment systems required by the HWMA/RCRA permit (carbon dioxide system, cover gas blankets gas monitoring, primary tank pressure instruments, cathodic protection for the reactor building, etc.).

- Operation of the EBR-II facility "hotel loads" including general lighting, electrical equipment, ventilation and heating equipment, radiation monitoring, fire detection and protection systems, the reactor building crane, etc.

- Systems that are needed for future remediation activities, such as the rotating plugs, the Primary Tank Heating Systems (PTHS) and the Cold Reference Junction Box (CRJB) system needed to keep thermocouples operable

<u>Preventative Maintenance</u>

- ✓ Site-wide utilities, such as electrical distribution, site cooling water, pure water systems, site-evacuation alarms and instrument air.

- ✓ Systems/components that contain materials that have controls governed by the Environmental, Safety and Health (ES&H) Manual, such as asbestos lagging, the acid and caustic tanks utilized in the demineralized water system, noise abatement controls, instrumentation containing mercury, compressed gas bottles used throughout the facility, etc.

- ✓ EBR-II facility infrastructure such as painting of structural components (reactor dome), roofing integrity, plumbing, and sewage.

- ✓ Office area utilities for the many work areas remaining in the EBR-II power plant, that have not been closed, such as lighting, air conditioners, computers, telephones, lunchrooms, etc.).

- ✓ Updating of the System Layup Files, as required by the Layup Operating Instruction and initiating facility documentation changes required due to modifications or remediation.

Administrative functions for the EBR-II complex are provided by Facilities Division personnel. These functions include such items as system configuration control, work control, and maintaining facility documents.

10.2. SURVEILLANCE AND MONITORING

10.2.1. WASTE SITES

After remediation activities have been completed and the remediation goals met, ongoing surveillance and maintenance comprises the scope of anticipated activities for the waste sites. The waste sites requiring surveillance and monitoring due to on-going remediation of radioactive contamination are the IWP, Interceptor Canal-Canal, and Interceptor Canal-Mound sites.

Basic elements of this S&M for these waste sites include:

- Inspections and surveys (radiological, postings, etc.),
- Groundwater monitoring samples,
- Repair and maintenance of signs and barriers,
- Revegetation and erosion survey, and
- Reporting policies and practices.

Inspections of the waste sites will fall into two types:

- Scheduled inspections
- Contingency inspections

Scheduled inspections as well as report submittals are summarized in Table 10-1.

Table 10-1: Summary of the Waste Site Inspection Schedules and Reports.

Inspections	Frequency	Report Frequency	
Revegetation with native plants[a]	In late summer for 3 years following seeding	DOE	WAG 9 Project Managers
Erosion survey	Annual	Annual	Every 5 years
Radiological surveys	Annual	Annual	Every 5 years
Signs and postings	Annual	Annual	Every 5 years
Permanent markers	Annual	Annual	Every 5 years
Land use restrictions	Annual	Annual	Every 5 years

[a.] Interceptor Canal-Mound only.

Follow-up inspections for repair/replacement activities will occur as determined by the ANL-W CERCLA Remediation Project Manager. Contingency inspections are unscheduled inspections ordered by DOE-CH; trigger events for these inspections may include severe rainstorms, floods, or highly unusual events such as tornadoes or earthquakes.

The ANL-W WAG 9 Remediation Project Manager will record inspection results on the inspection reporting forms (reference 5, Appendix B). The forms will be completed, signed, dated, and submitted to DOE-CH annually, or as needed in the case of contingency inspections. Every 5 years a review is conducted per the CERCLA ROD and a report is submitted to the WAG 9 Project Managers.

Monitoring of the SRPA (groundwater) near the ANL-W site is performed for three primary purposes:

- To verify that ongoing operations at ANL-W are not impacting groundwater,
- To identify contaminant migration from potential CERCLA release sites, and
- To ensure that CERCLA risk based modeling predictions remain valid.

The Comprehensive Remedial Investigation and Feasibility Study Final Work Plan for WAG 9 (reference 8) states that the sampling frequency, "following the first year of quarterly monitoring...will be reduced to semiannual monitoring." The RI/FS further states, "sampling frequency may then be reduced to annual at the discretion and consensus of the WAG-9 project managers and ANL-W."

Groundwater sampling is currently conducted semi-annually at each of the five wells in the ANL-W monitoring well network. These samples are generally collected in April and October of each year - depending upon the weather, personnel availability, and financial resources.

Sampling locations - 4 monitoring wells and one production well make up the ANL-W monitoring well network (see Figure 6-2). One well, located upgradient of the ANL-W site (ANL-MON-A-012) serves as the background water quality monitoring well. Four wells monitor potential impacts to the aquifer from the CERCLA areas listed below:

- ANL-MON-A-011 - EBR-II Leach Pit
- ANL-MON-A-013 - Industrial Waste Pond
- ANL-MON-A-014 - Main Cooling Tower Blowdown Ditch
- EBR-II #2 (production well) - Sewage Lagoons

Semi-annual groundwater samples will be collected from the monitoring wells through FY 2018 in accordance with the ANL-W Groundwater Monitoring Plan per regulatory requirements of the CERCLA ROD.

The Interceptor Canal-Mound reseeded area will be monitored qualitatively during annual inspections, in late summer for 3 years following reseeding to ensure proper growth. Qualitative determinations of nongrowth or sparse growth areas will be made through comparative growth

evaluations in undisturbed areas near the disturbed areas with consideration of the length of time since planting. Information will be recorded on the inspection reporting forms (reference 5, Appendix B). If seeding failure is experienced reseeding and fertilization procedures will be evaluated to determine what went wrong with the original seeding and updated as necessary. Reseeded areas will require follow-up inspections in late summer for 3 years to verify successful reseeding.

Surface erosion is not anticipated to be a problem at the Interceptor Canal-Mound site since it will have been leveled to grade. Observations of soil movement, as evidenced by the accumulation of soil on the up-slope side of plants, pedestaling of plants or rocks, or formation of rills or gullies, will be recorded with the extent of erosion noted. If rills and gullies are detected, appropriate soil will be added and compacted to bring the affected area up to the surrounding grade, as determined by visual approximation, and then reseeded. Photographs will be taken as needed.

10.2.2. EBR-II COMPLEX

On-going LTS activities in the EBR-II Complex that pertain to S&M are described below.

Surveillance

- ✓ Surveillance tours required by the HWMA/RCRA permit for treatment and storage of radioactive hazardous waste in EBR-II: These inspections are defined in the permit and are recorded on approved checksheets that are kept on-file in EBR-II.

- ✓ Surveillance tours required to maintain key facility/system components in an operating condition. These include the "logtaking" tours made to ensure equipment is functioning properly. These systems include those that are being maintained in an operational or standby status for future use, such as the Secondary Sodium Drain Tank (SSDT) and its associated sodium recirculation system, sodium piping trace heating and atmospheric oxygen monitoring.

11. SCHEDULES AND COST

11.1. WASTE SITES

FY costs for next eight years for the phytoremediation activities are:

FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
554K	554K	582K	641K	673K	707K	742K	780K

Schedules and details of the costs were not available at the time of development of this document but will be provided a later date. Changes in cost estimates may be necessary due to consideration being given to excavating the IWP versus phytoremediation.

11.2. CONTAMINATED FACILITIES

As previously agreed with DOE-NE, surveillance and maintenance activities for the EBR-II Complex will be funded under the current ANL-W infrastructure budget. Schedules and costs were not available at the time of development of this document but will be provided a later date.

12. MANAGEMENT ROLES AND RESPONSIBILITIES

ANL-W management has delegated overall program management, technical oversight, cost, and schedule responsibility for the LTS program to Environmental Programs (EP). The manager of EP is the functional manager for the program and has further delegated program management responsibility to the LTS Program Manager. LTS activities will be performed with a combination of ANL-W staff from EP and Facilities Division, and, as needed, employees of various other ANL-W divisions. The ANL-W organizations participating in the LTS program and their organizational arrangement within ANL-W are shown in the project Organizational Breakdown Structure (OBS) in Figure 12-1. Identified at the lower level, shown in Figure 12-1, are LTS activities and the organization responsible for the activity.

LTS activities at ANL-W EM sites represent only one element of the ongoing environmental management efforts at ANL-W, most of which are already financed and managed by NE as the

site landlord. The LTS program for EM sites (waste sites) cannot be properly understood unless its position within the larger context of ANL-W environmental management is understood. An example of overlapping environmental responsibilities is the relationship of the deactivation and closure of the Experimental Breeder Reactor-II primary and secondary sodium systems under the HWMA/RCRA to the monitoring and reevaluation of potential releases from radioactively contaminated co-located facilities under CERCLA. The LTS program at ANL-W will be integrated into these existing environmental management efforts.

This integration will provide the mechanism for meeting (1) the CERCLA Record of Decision (ROD) conditions such as monitoring and (2) evaluation of activities completed for removal of hazardous constituents (i.e., HWMA/RCRA closure, decontamination and decommissioning (D&D)).

The principal functional areas and organizations that will be participating in the LTS Program and associated LTS responsibilities are as follows:

- Environmental Programs (EP)
    - LTS Program Manager
        - Request and manage LTS Program funds;
        - Oversee LTS Program Implementation;
        - Provide technical and managerial oversight over the LTS Program;
        - Ensure LTS records are kept up to date;
        - Single point of contact for inquiries into waste site status and historic information;

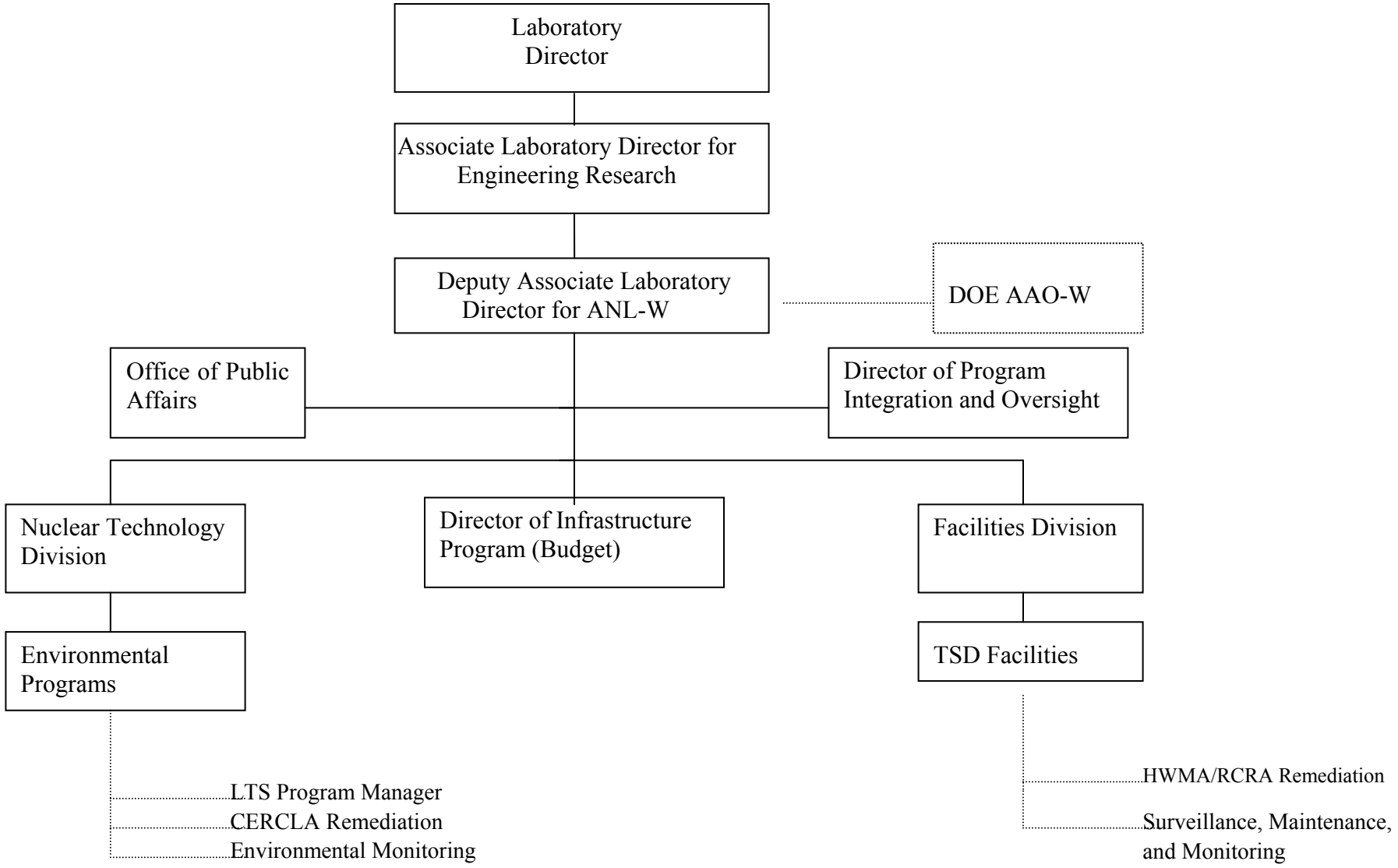

Figure 12-1: Long-Term Stewardship Organizational Structure

- Establish and maintain the LTS Plan for ANL-W;
- Prepare program scope, cost, and schedule plans;
- Oversee participation of other ANL-W organizational units;
- Ensure that routine inspection and surveillance of LTS sites are performed; and
- Maintain database on regulatory status of LTS units;
- Monitor regulatory environment to identify changes that might affect LTS units or the LTS Program.
- Ensure that operational remedies are operated and maintained properly
- Communicate problems or concerns related to LTS sites to ANL-W management.

- CERCLA Remediation

  - Continue phytoremediation planting and harvesting;
  - Access restrictions: install posted signs and permanent markers to prevent residential intrusion.
  - Periodic inspection & maintenance to ensure integrity of institutional controls
  - Develop necessary documentation (i.e., 5-year review, compliance with cleanup standards, nature of any residual contamination) for submittal to EPA Region X and IDEQ as necessary;
  - Integrate knowledge of LTS sites and associated land use restrictions into site land use planning documents;
  - Transfer historic documents for completed waste site to the LTS Program.

- Environmental Monitoring

  - Conduct routine (air, soil and groundwater) environmental sampling at all LTS sites;
  - Review analytical results and prepare reports for submission to the EPA Region X and/or IDEQ; and
  - Keep ANL-W environmental monitoring database up to date.

• T/S/D Facilities

- HWMA/RCRA Remediation

  - Generate plans, schedules and cost estimates for HWMA/RCRA treatment and storage
  - Perform required regulatory surveillance and maintenance on HWMA/RCRA systems
  - Perform HWMA/RCRA treatment of residual Na and NaK;
  - Communicate with regulatory agencies regarding regulatory issues, and
  - Keep TSD operating records up to date.

- Surveillance, Monitoring and Maintenance

  - Generate plans, schedules and cost estimates for surveillance, monitoring and maintenance for the EBR-II Complex;
  - Perform required inspections and maintenance on HWMA/RCRA Systems

• Director of Program Integration and Oversight

  - Provide independent management oversight to LTS Program;
  - Ensure that sufficient funds to support the LTS Program are requested in accordance with the LTS Baseline;
  - Conduct periodic assessments and audits of the LTS Program;
  - Ensure that the LTS Program is effectively integrated into other environmental management functions;
  - Ensure that institutional controls (deed restrictions) are complied with;
  - Ensure adequate upper level management attention to LTS issues,
  - Review and approve the LTS Implementation Plan, and
  - Communicate problems or concerns related to LTS sites to DOE management.

• Office of Public Affairs (OPA)

  - With the assistance of the LTS Program Manager, prepare information suitable for public release regarding the LTS Program;
  - Review technical information prior to making it available to the general public
  - Prepare press releases or other communications as necessary to explain the LTS Program and any issues of general interest that arise from this program in the future;
  - Field information requests from the general public related to the former waste sites, obtain a response from knowledgeable persons within ANL-W, and convey the response to the person making the inquiry.

• U.S. Department of Energy-Argonne Area Office (DOE-AAO)

  - Provide guidance relative to LTS Program requirements;
  - Review and approve key plans related to the LTS Program, including the LTS Program Plan;
  - Provide support as required to obtain adequate funding for the LTS Program;
  - Ensure that required institutional controls (deed restrictions, Interagency Agreements, Memoranda of Understanding, etc.) are put in place and maintained; and
  - Ensure that DOE management is informed of the status and issues related to the LTS Program.

Many of the LTS requirements are similar to other ongoing activities and do not represent large commitments of time or money. Many of the participants in the LTS Program will perform their respective duties for the program from within their existing organizations. The ANL-W LTS

Program organization will be minimal, consisting of the LTS Program Manager. The primary role of the LTS Program organization will be to coordinate the efforts of the various participants and assemble, review, and manage information generated by the different functional groups. The LTS Program Manager will also serve as a single point of contact for information about the LTS program, both internal to ANL-W and external to DOE.

12.1. COMMUNICATION AND REPORTING

Information management and Stakeholder involvement are key elements of the ANL-W LTS program. In light of technological and economic limitations that will result in leaving contamination and/or wastes in place, ANL-W is committed to ensuring waste sites and contaminated facilities are managed to prevent future exposure pathways – i.e., maintain and monitor physical and institutional controls over the time period necessary. It is the role of ANL-W's LTS program to ensure that the necessary management takes place and that future stakeholders have access to the information necessary for them to evaluate the consequences of events and proposed changes over time.

12.1.1. INFORMATION MANAGEMENT

Sites, such as ANL-W, with on-going missions have generated large amounts of data. Contained in the data are decisions, assumptions, analytical data, project work plans, monitoring results, final construction reports, final survey reports, correspondence, and other applicable documents which describe the actions taken and the final conditions of the site. The information needs to be retained for future stewards and site decision makers. This information, as part of ANL-W's commitment to the regulators and stakeholders, is readily available either at the INEEL CERCLA Administrative Records Repository (i.e., ROD, RD/RA reports) or at the ANL-W site. As previously identified, the LTS Program Manager in conjunction with the ANL-W Office of Public Affairs will respond to requests for LTS information from the public and stakeholders.

12.1.2. STAKEHOLDERS

Sites at ANL-W that result in residual contamination remaining after cleanup or until cleanup is completed, many years from now, will require LTS. DOE and ANL-W are committed to obtaining stakeholders participation and agreement in the early stages of LTS activities. Stakeholder involvement on regulatory changes, land use changes, technology effectiveness, facility missions, etc., provide a means to ensure that selected remedies, institutional controls, and land use activities at ANL-W remain protective and in effect for future generations. As part of the INEEL, ANL-W will provide support to the INEEL stakeholders in understanding the uncertainties related to LTS activities and work with the INEEL stakeholders to provide cost-effective LTS activities at ANL-W.

Documentation of INEEL Stakeholder involvement will be identified in a Public Participation Plan developed for the INEEL (DOE-Idaho document) with ANL-W's input.

13. EMERGENCY PREPAREDNESS AND RESPONSE

The ANL-W Emergency Management Plan (reference 9) details the overall process for responding to and mitigating any consequences of operational emergencies that might arise at ANL-W. Specifically, it provides guidelines necessary to protect:

- The health and safety of personnel at ANL-W
- The general public in areas surrounding ANL-W
- Buildings and complexes at ANL-W
- The environment.

The ANL-W Emergency Management Plan applies to operational emergencies (unplanned, significant events or conditions that require time-urgent response from outside the immediate/ affected site/facility or area of the incident) that may originate at or affect ANL-W. The Plan applies to the ANL-W site, including the buildings, complexes, equipment, and other stationary structures for which ANL-W is responsible. It is designed to comply with, supplement, and be compatible with the HWMA/RCRA Contingency Plan (reference 7, Section G) for the EBR-II Complex and the waste sites "Emergency Response Plan for Remedial Activities" (reference 5, Appendix D).

Both the HWMA/RCRA contingency plan and the waste sites emergency response plans have been reviewed by the lead regulatory agencies (IDEQ and EPA Region X, respectively) and approved.

14. AUDITS

An audit conducted by knowledgeable personnel not directly responsible for LTS activities will be performed within 12 months of implementation of the LTS plan and biennially thereafter. The audit will look at the following:

- The effectiveness of the LTS program
- The overall performance and achievement of LTS program objectives
- Compliance with regulatory and DOE requirements
- Costs and scheduling
- Organizational interfaces

A report will be provided on deficiencies and recommendations for improvements. This audit report will be rolled into the annual management assessment report for the ANL-W site per the ANL-W Procedure 5.1 (reference 10).

15. MANAGEMENT REVIEW

In accordance with ANL-W Procedures 5.1 "Annual Management Assessment" and 5.6 "Periodic Management Assessment" (reference 11), the LTS program will be reviewed. This review is in support of the Integrated Safety Management (ISM), which (1) ensures continued adherence to ANL policies, (2) measures and reports progress toward meeting performance

objectives, and (3) ensures that problems which hinder achieving performance objectives are identified and corrected.

The management review of the LTS program will be conducted as specified by the ANL-W NTD Director. Modifications to the LTS program resulting from management reviews will be incorporated into the LTS Implementation Plan.

16. FINAL PROJECT CLOSEOUT

At the completion of all remedial actions (including institutional controls) for the former waste site any monitoring systems and/or institutional controls put in place will need to be removed.

The final project closeout from the LTS program of the EBR-II Complex will require the following to be completed:

- Treatment and/or removal of residual Na and NaK
- Completion of the HWMA/RCRA closure activities (i.e., final rinse)
- Certification of HWMA/RCRA closure by an Independent Professional Engineer
- State approval that HWMA/RCRA closure has been completed
- Begin Decontamination and Decommissioning of the EBR-II Complex

The final project closeout of the waste sites will require the following to be completed:

- Phytoremediation and excavation completed
- Validation sampling completed and approved by EPA, IDEQ, and DOE
- Radioactive contamination (Cs-137) decayed to below the Remediation Goals (approximately 100 yrs)
- Revegetation completed for sites identified in Remedial Design/ Remedial Action Work Plan
- Remedial Action Report

  The remedial action report will be prepared following demobilization and restoration of the site, and submitted to the Agencies as a primary document. The remedial action report will include:

  - Identification of the work defined in the RDRA work plan and certification that work was performed.
  - Explanation of any modifications to the RD/RA Work Plan.
  - Any modifications made to the remedial design during the remedial action phase, including the purpose and results of any modifications.
  - Problems encountered during the remedial action and resolutions to these problems.
  - Any outstanding items from the prefinal inspection report that were identified and described. (In responding to comments received, the prefinal inspection report will not be revised, but rather will be finalized in the context of the remedial action report.)

- Copy of waste acceptance sheets for soil disposal.
- Final Inspection results. (Any final inspection will be documented in the draft remedial action report, submitted to the Agencies Project Managers within 60 calendar days of the final inspection, and used to resolve prefinal inspection issues.)
- EPA and IDEQ provide approval that remediation activities have been completed in accordance with the ROD.

REFERENCES

(1) ANL-W Waste Descriptions (Draft), 1973
(2) ANL-W, *Final Record of Decision,* Doc. No.W7500-0000-ES-04, September 1998
(3) DOE, *Long Term Stewardship Plan Guidance,* Working Draft, April 17, 2001
(4) *Experimental Breeder Reactor-II Complex Transition Planning*, F0000-0077-ES-00, March 29, 2002
(5) ANL-W, *Final Remedial Design*, Doc. No.W7500-0550-ES-00, October 1999
(6) EBR-II Plant Closure Implementation Plan," Doc. No. F0000-0062-ES-00, October 18, 2000
(7) ANL-W *HWMA/RCRA Permit Application for the EBR-II Complex (Buildings 766, 767, and 795)*, Doc. No. W0001-1021-ES-01, May 2002
(8) *Comprehensive Remedial Investigation/Feasibility Study for Argonne National Laboratory-West Operable Unit 9-04 at the Idaho National Engineering Laboratory (Final),* Doc. No.W7500—0549-ES-02, October 1997.
(9) ANL-W Emergency Management Plan
(10) ANL-W Procedures**:** AWP 5.1, *Annual Management Assessments*.
(11) ANL-W Procedures**:** AWP 5.6, *Periodic Management Assessments*.

Appendices A: ANL-W Site Characteristics

The U.S. Weather Bureau established a monitoring station at the INEEL Central Facilities Area (CFA) in 1949. A 250-ft tower is also located just outside the east security fence of the ANL-W area; however, this tower has not been in continuous operation for as long as the CFA station. The longest and most complete record of INEEL meteorological observations exists for the CFA weather station.

Air Temperature

Data have been collected from both the two- and ten-meter tower locations above the ground surface at ANL-W. The two-meter data set is limited in time from August 1993 to the present. The record presented is considered typical of temperature conditions in the vicinity of the ANL-W facility. Although there is a much longer record available from the CFA station, the distance of ANL-W from that station precludes its use. Therefore, these data are presented here because they more accurately portray surface conditions at ANL-W. The maximum average monthly temperature during the time of record was 84.8°F for July and the minimum average monthly temperature of 7.9°F was recorded in December.

Precipitation

Precipitation is not measured at the ANL-W tower. However, the National Oceanic and Atmospheric Administration (NOAA) conducted an evaluation and the use of CFA data for these parameters is reasonable. Precipitation was measured as rainfall and snowfall for the period January 1950 to December 1988. During this period, most of the precipitation was received in May and June and averaged 1.2 inches, while the annual total average was 8.71 inches. As could be expected, most snowfall occurred during December and January. The monthly average snowfall event for December and January was 6.4 and 6.1 inches, respectively. Wet bulb temperature humidity measurements from CFA run from 1956 to 1961. The highest average occurred in the winter at 55%; a low average of 18% was recorded in the summer.

Evaporation and Infiltration

Although NOAA does not measure pan evaporation at the INEEL, adjusted Class A values have been made through regression analysis of other southeast Idaho sites. Data from 1950–51, 1958–59, 1963–64, and 1969–70 yielded an adjusted range of 40 to 46 inches per year. Other estimates for the INEEL have values of 36 inches per year from saturated ground, 32 to 36 inches per year from shallow lakes, and 6 to 9 inches per year from native vegetation. Evaporation rates calculated from the drop in level of the ANL-W Industrial Waste Pond (IWP) yield values between 0.85 and 0.14 inches per day for summer and winter, respectively. Infiltration as calculated by using the hydrologic equation (Equation 5.1 of *Water Supply and Pollution Control, Fourth* Edition) and solving for the infiltration term. This yields values for the IWP of between 0.48 to 0.004 inches per day for summer and winter, respectively.

Wind

Wind measurements at ANL-W are made at the two and ten meter heights and at the top of the tower (250 ft above the ground surface). From these data, ANL-W is clearly subject to the same southwest and northeast winds as the rest of the INEEL. Winds tend to be diurnal with up-slope winds (those out of the southwest) occurring during the day and down-slope winds (those out of the northeast) occurring at night. During the 5-year time of record at ANL-W from 1990 to 1994, winds blew from the southwest 14% of the time, from the south-southwest 11% of the time, and from the northeast 10% of the time.

Geology

Much of the INEEL surface is covered by Pleistocene and Holocene basalt flows. The second most prominent geologic feature is the flood plain of the Big Lost River. Alluvial sediments of Quaternary age occur in a band that extends across the INEEL from the southwest to the northeast. The alluvial deposits grade into lacustrine deposits in the northern portion of the INEEL, where the Big Lost River enters a series of playa lakes. Paleozoic sedimentary rocks make up a very small area of the INEEL along the northwest boundary. Three large silicic domes and a number of smaller basalt cinder cones occur on the INEEL and along the southern boundary.

Surface Geology

Surficial materials at ANL-W facilities are found within a topographically closed basin. Low ridges of basalt found east of the area rise as high as 100 feet above the level of the plain. Surficial sediments cover most of the underlying basalt, except where pressure ridges form basalt outcrops. Thickness of these surficial sediments ranges from zero to 20 feet (Northern Engineering and Testing, Inc. 1988).

Test borings at ANL-W have revealed two distinct layers in the surface sediments. The uppermost layer, from zero to several feet below land surface (BLS), consists of a light brown silty loam. The upper 1 to 2 feet of this silty loam layer contains plant roots. This silty loam layer may also contain basalt fragments in areas where it directly overlies basalt.

The lower layer is sandy-silt (loess) that extends to the underlying basalt. The loess of this layer was probably transported by wind from other parts of the plain. The windblown loess is calcareous and light buff to brown in color. Small discrete lenses of well-sorted sands that occur within the loess are probably the result of reworking by surface runoff into local depressions. The lower portion of this loess layer often contains basalt fragments of gravel to boulder size. The surface of the underlying basalt, whether it is in contact with the upper or lower layer, is highly irregular, weathered, and often very fractured.

Subsurface Geology

The subsurface lithology presented in this section is based on information gathered from past and recent borings around the ANL-W facility. Information gathered from recent borings (i.e., those drilled after 1992) have lead to a better understanding of the subsurface geology around ANL-W. The deep geology around ANL-W is dominated by basaltic lava flows. Minor discontinuous sedimentary interbeds occur at various depths, overlying the tops of basalt flows.

The subsurface geology at ANL-W is similar to that on the rest of the INEEL. The most striking difference is the lack of continuous sedimentary interbeds beneath the facility. Those sedimentary interbeds intercepted during drilling appear to be discontinuous stringers, deposited in low areas on basalt surfaces. These interbeds are generally composed of calcareous silt, sand, or cinders. Rubble layers between individual basalt flows are composed of sand and gravel to boulder sized material. The interbeds range in thickness from less than 1 inch to 15 feet. In 1988, drilling near the IWP an interbed was encountered between 40 to 50 feet BLS. This interbed is not continuous across the ANL-W area and does not appear west of the IWP. More aerially extensive interbeds have been identified above the regional water table, at approximately 400, 550, and 600 feet BLS (Northern Engineering and Testing, Inc. 1988). The depth to the SRPA below the ANL-W facility is approximately 640 feet BLS. The nature of these sedimentary interbeds and rubble zones does not appear to cause perching, but may retard the downward movement of water and produce preferred flow paths.

The thickness and texture of individual basalt lava flows are quite variable. Individual basalt flows range in thickness from 10 to 100 feet. The upper surfaces of the basalt flows are often irregular and contain many fractures and joints that may be filled with sediment. The existence of rubble zones at variable depths and extents are shown from caliper logs of hole diameters that reveal zones of blocky or loose basalt. Exposed fractures commonly have silt and clay infilling material. The outer portions of a flow (both top and bottom) tend to be highly vesicular. The middle portions of the flow typically have few vesicles and are dominated by vertical fractures formed during cooling.

The variability of basalt thickness and fracturing also plays an important role in well response to changes in the SRPA. This effect is most notable in well responses to barometric pressure changes. These responses to the barometric pressure changes result in groundwater elevation data that has to be corrected for barometric pressures in order to plot the contour of the water surface. Most of the wells at ANL-W act as water table wells with a rapid response to barometric fluctuations. However, wells ANL-MON-A-11 and the new well ANL-MON-A-14 are very slow to respond to barometric changes, often taking many hours to re-equilibrate to barometric shifts. Review of the driller's logs for these wells show that a thick, apparently massive basalt rests just above the water table. This thick flow acts as a confining layer and restricts free air exchange near the well bore. Discussions with the INEEL field office of USGS suggest this is common on the INEEL and that the local area of such effects tends to be on the order of hundreds of feet. Neither the USGS nor ANL-W believes that this effect influences the wells' ability to intercept upgradient contaminants from the Leach Pit (ANL-08) and the Main

Cooling Tower Blowdown Ditch (ANL-01A). Furthermore, placement of the well away from the immediate downgradient edge of the source area allows for any lateral spreading of contaminants that may occur above this dense basalt before entry into the aquifer.

The sequence of interbedded basalt and sediments, discussed above, continues to well below the regional water table. The regional water table is typically encountered at an elevation of about 4,483 feet above mean sea level (MSL) near the ANL-W facility. A deep corehole was drilled in 1994 in an attempt to locate the effective base of the aquifer. This base is a layer below which the hydraulic conductivities drop by orders of magnitude. A large sedimentary interbed (up to 100 feet thick) and a marked change in the alteration of the basalts characterize the contact of the effective base. This contact was encountered at a depth of 1,795 feet BLS in the deep corehole at ANL-W. The sedimentary layer was approximately 15 feet thick.

Soils

The ANL-W site is located on a small meadow within a local drainage. The thickness of the surficial sediment in the vicinity of the ANL-W site range from outcroppings at the surface to depths of 14 feet. In general, the depths of the surface soils above the basalt tend to increase from approximately 2 feet on the east side of the facility to a depth of 14 feet near the west side of the security fence.

The general soil types are 425-Bondfarm-Rock outcrop-Grassy Butte complex and 432-Malm-Bondfarm-Matheson complex. The soil type 425-Bondfarm-Rock outcrop-Grassy Butte complex is found over all the sites in OU 9-04. This soil consists of 40% Bondfarm loamy sand, 30% rock outcrop, and 20% Grassy Butte loamy sand. The Bondfarm soil is found on the concave and convex side slopes and is surrounded by hummocky areas of the Grassy Butte soils. Rock outcrop is in the areas of slightly higher than areas of Bondfarm soils. Also included in this complex are about 10% Matheson loamy sand, a soil that is similar to the Grassy butte soils but that is less than 40 inches deep to bedrock, and Terreton loamy sand. The Bondfarm soil is shallow and well drained. It formed from eolian material. Typically, the surface layer is light brownish gray loamy sand about 4 inches thick. The subsoil and substratum are very pale brown sandy loam 14 inches thick. Basalt is at a depth of 18 inches. The soil is calcareous throughout and may have a layer of lime accumulation at depth. The permeability of the soil is moderately rapid. Effective rooting depth is 10 to 20 inches. Available water capacity is low. Surface runoff is slow or medium, and the hazard of erosion is slight or moderate. The hazard of vegetated soil blowing is very slight.

Rock outcrop consists of exposed basalt rock. Crevices in the rock contain some soil material that supports a sparse stand of grasses, forbs, and shrubs. While, the Grassy Butte soil is very deep and somewhat excessively drained. It formed in sandy eolian material. The underlying material to the depth of 60 inches or more is grayish brown and gray loamy sand. The soil is calcareous throughout and has a layer of lime accumulation at a depth of 19 inches. The permeability of the soil is rapid. Effective rooting depth is 60 inches or more, and the available water capacity is low or moderate. Surface runoff is very slow or slow. The hazard of vegetated soil blowing is very high.

Hydrogeology

Recharge to the SRPA in the vicinity of ANL-W occurs as snowmelt or rain. During rapid snowmelt in the spring, moderate recharge to the aquifer can occur. However, high evapotranspiration rates during the summer and early fall prevents significant infiltration from rainfall during this period. Because of the distance from the surrounding mountains and permanent surface water features (i.e., the Big Lost River), the SRPA beneath ANL-W is unaffected by underflow or recharge from these sources.

No permanent, natural surface water features exist near the ANL-W site. The existing surface water features (e.g., drainage ditches and discharge ponds) were constructed for ANL-W operations for the collection of intermittent surface runoff. A natural drainage channel has been altered to discharge to the Industrial Waste Pond (IWP) via the Interceptor Canal. Under the unusual conditions when the air temperature has been warm enough to cause snowmelt, but the ground has remained frozen, precluding infiltration, surface runoff along this channel has discharged to the IWP. This condition most recently occurred during the spring of 1995. During this time, flow was visible from the surrounding basin into the IWP for approximately 4 days. However, at no time did any water discharge from the pond to the downstream channel. Before 1995, the most recent occurrence of this situation was in 1976.

Perched water is defined as a discontinuous saturated lens with unsaturated conditions existing both above and below the lens. Classical conceptualization of a perched water body implies a large, continuous zone of saturation capable of producing some amount of water. These perched zones can occur over dense basalt that exhibits low hydraulic conductivity in addition to sediment interbeds that have low permeability. It is unknown which conceptual model is more prevalent at the INEEL. However, in subsurface basalt at ANL-W, the “perched water” appears as small, localized zones of saturated conditions above some interbeds and within basalt fractures, which are incapable of producing any significant amount of water.

Surface Water Hydrology

Most of the INEEL is located in a topographically closed drainage basin, commonly referred to as the Pioneer Basin, into which the Big Lost River, Little Lost River, and Birch Creek may drain. These streams drain mountain watersheds to the north and west of the INEEL, including the Pioneer, Lost River, Lemhi, and Centennial mountain ranges. Land surface elevations rise from 4,774 feet in the basin to 12,656 feet on Borah Peak in the Lost River Range (Bennett 1990). Rainfall and snowmelt within the upper basin contribute to surface water, mainly during spring.

Most of the water in these streams is diverted upstream of the INEEL for irrigation or is lost to the subsurface due to high infiltration rates in the channel bed. During periods of high flow, some surface water may reach the INEEL. This water is approximately 15 miles west of the ANL-W facility. Because there are no permanent, natural surface water features near ANL-W, flooding is not a major concern. During rapid snowmelt events at ANL-W the Interceptor Canal and the IWP receive surface water runoff. There is a diversion dam constructed south of the

facility to handle these events. This dam has a headgate that, when closed, diverts water into the adjacent drainage ditch and eventually to the Interceptor Canal, and from there directly into the IWP. No surface outflow leaves the INEEL, except for minor local slope runoff.

The INEEL is located in a cool desert ecosystem characterized by shrub-steppe vegetation communities typical of the northern Great Basin and Columbia Plateau Region. The surface of the INEEL is relatively flat, with several prominent volcanic buttes and numerous basalt flows that provide important habitat for small and large mammals, reptiles, and some raptors. Juniper woodlands occur near the buttes and in the northwest portion of the INEEL; these woodlands provide important habitat for raptors and large mammals. Limited riparian communities exist along intermittently flowing waters of the Big Lost River and Birch Creek drainages.

Wildlife species present in and around ANL-W include birds, mammals, and reptiles that are associated with facilities, sagebrush-steppe, rock outcroppings, deciduous trees and shrubs, grasslands, and water (e.g., IWP, Sanitary Sewage Lagoons, and drainage ditches). Both terrestrial and aquatic species are potentially present. Sagebrush communities surrounding ANL-W typically support a number of species including sage grouse (*Centrocercus urophasianus*), sage sparrow (*Amphispiza belli*), and pronghorn (*Antilocapra americana*). Rock outcroppings associated with these communities also provide habitat for species such as bats, woodrats (*Neotoma cinerea*), and sensitive species such as the pygmy rabbit (*Brachylagus idahoensis*). Nearby grasslands serve as habitat for species including the western meadowlark

(*Sturnella neglecta*) and mule deer (*Odocoileus hemionus*). ANL-W facility structures also provide important wildlife habitat. Buildings, lawns, ornamental vegetation, and ponds are utilized by a number of species such as waterfowl, raptors, rabbits, and bats. Lawns can be an important resource to species at ANL-W (the source of the water for these lawns is from the ANL-W deep wells). No surface hydrology has existed to support fish. Current and future aquatic invertebrates are, however, supported by habitat provided by the Sewage Lagoons and the IWP while they are receiving wastewater from the facility.

A screening-level ecological risk assessment (SLERA) has also been conducted at ANL-W. The plant oxytheca (*Oxytheca dendroidea)* typically supports a number of species including sage grouse which was listed as a sensitive species with the U.S. Bureau of Land Management and the Idaho Native Plant Society/Idaho Fish and Game Conservation Data Center.